INTERNATIONAL COMMITTEE OF
THE RED CROSS
(ICRC)
GENEVA
Switzerland

MISSION OF APPRAISEMENT OF THE VETERINARY VACCINES PRODUCTION LABORATORY IN KABUL (Islamic Emirate of Afghanistan)

FINAL REPORT

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TO :
International Committee of the Red-Cross – Delegation in KABUL (Afghanistan)

TITLE :
Mission of appraisement of the veterinary vaccines production laboratory in KABUL (Islamic Emirate of Afghanistan)

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April 1999 – CIRAD-EMVT, Montpellier – FRANCE

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AFGHANISTAN

KEY-WORDS :
Anthrax vaccine, Afghanistan, vaccine production, anaerobic vaccines, Newcastle vaccine.

SUMMARY :

This mission focused mainly on the Anthrax vaccine production technology currently performed in the laboratory of KABUL (Afghanistan).
The different steps of the process have been checked and some technical recommendations introduced.
On the other hand, the consultant proposed to extend the present production to some anaerobic bacterial vaccines (blackleg, enterotoxemia) and in a second phase to the Newcastle vaccine, to fulfill the urgent needs of the country. Estimates for laboratory equipments, refurbishments, calculation of production costs and training are proposed.
The last chapter of the report introduces the problem of the financial management of this laboratory and its necessary self-sustainability in the future in the frame of a cost recovery system.

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I - TERMS OF REFERENCE

I – TERMS OF REFERENCE : REMINDER

1. To ensure the vaccine centre is up to international standards or at least not sub-standard to the requirements in terms of :

   a) The infrastructure of the laboratories

   b) Minimal safety standards are maintained

   c) Ensure the quality of the vaccine is being maintained

   d) Testing regime for the vaccines is correct

   e) Quality of staff

2. To come up with recommendations in terms of :

   a) Is it applicable for the ICRC to continue with its support for the vaccine production in accordance with the above requirements ?

   b) And if so what improvements should/could be made.

II - TIMING OF THE MISSION

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Wednesday 24.03.1999 :

- A.M. :
  - International flight : Paris/Genova
  - Briefing in the ICRC Headquarters in Genova
- P.M. : Briefing (continuing)

Thursday 25.03.1999 :

Departure in the morning for two international flights GENOVA/LONDON – LONDON/ISLAMABAD

Friday 26.03.1999 :

- A.M. :
  - Arrival in ISLAMABAD in the morning
  - Domestic flight : ISLAMABAD/PESHAWAR
  - Welcome by a representative of the ICRC Sub-Delegation in PESHAWAR
  - Immediate transfer to KABUL by an ICRC aircraft
  - Welcome in KABUL by representatives of the ICRC Delegation in KABUL and transfer to the ICRC guest-house.
- P.M. : Rest and consultation of documents.

Saturday 27.03.1999 :

- A.M. : Meeting with Mr. Daniel GAGNON Eco-Sec Delegate
- P.M. :
  - Consultation of documents
  - Preparation of the mission

Sunday 28.03.1999 :

- A.M. :
  - Meeting in the ICRC in KABUL with Dr. A.H. NAWROZ, representative of ICRC for vaccine production and Mr. Daniel GAGNON (Eco-Sec Delegate)
  - General visit of the Veterinary vaccine production Laboratory in KABUL and meeting with Dr. A.H. NAWROZ and the technicians staff.

- P.M. :
  - Continuing the meeting
  - Consultation of documents.

Monday 29.03.1999 :

- A.M. :
  - Meeting with Dr. A.H. NAWROZ
  - General technical evaluation of the Laboratory in KABUL
- P.M. : Continuing the work with technicians.

Tuesday 30.03.1999 :

- A.M. :
  - Meeting with Mr. RODERICK CHARTERS (Eco-Sec Co-Ordinator)
  - Meeting with H.E. the Minister of Agriculture of Afghanistan
- P.M. :
  - Visit of an ICRC Veterinary Clinic in KABUL
  - Meeting with Dr. A.H. NAWROZ
  - Meeting with Mr. RODERICK CHARTERS (Eco-Sec Co-Ordinator)

Wednesday 31.03.1999 :

- A.M. :
  - Briefing with Mr. RODERICK CHARTERS and his staff
  - Technical evaluation of the Anthrax vaccine production process in the Laboratory in KABUL.
- P.M. : Continuing the evaluation and discussion of prospects.

Thursday 1.04.1999 :

- A.M. :
  - Continuing the evaluation and discussion with the Laboratory's staff for the vaccine production strategies in the future.
- P.M. :
  - Week-end in Afghanistan
  - Consultation of documents
  - Writing the report

Friday 2.04.1999 :

- A.M. :
  - Week-end in Afghanistan
  - Writing the report

- P.M. : Meeting in the laboratory in KABUL with the technicians to review the lay-out of the present facilities and the needs of consumables for Anthrax, HS, Enterotoxemia and Blackleg vaccines.

Saturday 3.04.1999 :

- A.M. :
  - Meeting in the Faculty of Veterinary Medicine of KABUL with the Dean of the Faculty and his staff
  - Visit of a veterinary clinic in KABUL belonging to the Ministry of Agriculture and supported by FAO
  - Meeting in the Ministry of Agriculture with representatives of the Veterinary Department
  - Visit of the sites of the Central Veterinary diagnostic and quality control laboratory and of the former veterinary vaccine production center both destroyed during the conflicts.
- P.M. :
  - Review in the laboratory in KABUL of the costs of the vaccines and the needs of equipment.
  - Visit of an ICRC Veterinary Clinic in KABUL.

Sunday 4.04.1999 :

- A.M. :
  - Meeting with Dr. LUTFUNAH (VTC) Master Trainer of FAO, veterinary monitor in KABUL.
  - Meeting in the veterinary vaccine production Laboratory to review the lay-out of the technical rooms.
- P.M. :
  - Field visit 6 kms from KABUL with the responsible of the ICRC Veterinary Clinic for an Anthrax vaccination campaign of some sheep flocks
  - Visit of the ICRC Veterinary Clinic.

Monday 5.04.1999 :

- A.M. :
  - Meeting with Mr. RODERICK CHARTERS Eco-Sec Co-Ordinator
  - Meeting in the infectious diseases Hospital in KABUL.
  - Final meeting in the Veterinary vaccines production Laboratory in KABUL.
- P.M. :
  - Meeting with Mr. RODERICK CHARTERS Eco-Sec Co-Ordinator
  - Final meeting in the ICRC Delegation with Mr. MARKUS DOLDER, head of the delegation and Mr. Roderick CHARTERS responsible of the agro-vet. Staff.

Tuesday 6.04.1999 :

- A.M. : Domestic ICRC flights KABUL/JALALABAD
- P.M. : Meeting in the Madera Veterinary vaccines production Center and general visit of the laboratories.

Wednesday 7.04.1999 :

Transfer by ICRC car : JALALABAD – PESHAWAR (Pakistan)

Thursday 8.04.1999 :

Final meeting in the MADERA office in PESHAWAR with representatives of FAO (ISLAMABAD), MADERA (PESHAWAR) ICRC (KABUL).

Friday 9.04.1999 :

- A.M. : Writing the report
- P.M. : Domestic flight PESHAWAR/ISLAMABAD

Saturday 10.04.1999 :

- International flight ISLAMABAD/LONDON/PARIS
- Arrival in PARIS at 8:45 p.m. local time.

III - PEOPLE ENCOUNTERED

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GENOVA – Switzerland

- Mrs Hendrika VAN BEEREN DONK RH/SAN
- Mrs Yannick MARQUIS RH/SANSECLO
- Mr. Pascal MAUCHLE OP/ASLAT/SO
- Mr. Thomas SEGHEZZI RH/SANSECLO
- Mr. Scott GARDINER OP/SANSEC/S

KABUL - Afghanistan

- **ICRC :**
  - Mr. MARKUS DOLDER head of delegation
  - Mr. David OVER LACK Health delegate
  - Mr. Jean-François RAPIN Administrative Co-ordinator
  - Mr. Daniel GAGNON Eco-Sec Delegate
  - Mr. RODERICK CHARTERS Eco-Sec Co-Ordinator
  - Dr. A.H. NAWROZ representative of ICRC and supervisor of the vaccine production laboratory in KABUL
  - Dr. NOOR AHMAD Vet team ICRC
  - Dr. RASHIDI Vet team ICRC
  - Dr. A. WASSEI ICRC Clinic in KABUL

- **MINISTRY OF AGRICULTURE OF AFGHANISTAN (KABUL)**
  - H.E.MAWLAWI ABDUL LATIF MANSOOR, Minister of Agriculture
  - Dr. QARI JAMEEL President of the Veterinary Department
  - Dr. ABDUL GHAFAR TORIALAY, Deputy President of the Veterinary Department
  - Dr. AHSAN BARAKZAI, Chief of the preventives department and President of the KABUL Veterinary Surgeons Association (KVSA)
  - MAWLAWI MOHAMAD YUSUF, Chief of the vaccine production

- **VETERINARY VACCINES PRODUCTION LABORATORY**
  - Mr. ALI MOHAMAD, VIRAL VACCINES, Responsible for the management of the laboratory, Government representative
  - Mr. A. RUB, viral vaccines
  - Mr. A. WAKIL, anthrax vaccine
  - Mr. ABDUL SAMAD, enterotoxemia and blackleg vaccines
  - Mr. A. AHAD, enterotoxemia and blackleg vaccines

- **FACULTY OF VETERINARY MEDICINE (KABUL)**
    - Pr. AMINUDDIN (Dean of the Faculty)

- **FAO VETERINARY TRAINING CENTER (KABUL)**
    - Dr. LUTFUNAH, Master trainer of FAO, Veterinary monitor in KABUL

- **INFECTIOUS DISEASES HOSPITAL – KABUL**
    - MAWLAWI ABDUL MANAN, Head of the Hospital
    - Dr. MOHAMAD QASIM, Men division responsible
    - Dr. A. JALEEL HASSAN, Chief of Department

JALALABAD – Afghanistan

- **MADERA VETERINARY VACCINES PRODUCTION LABORATORY**
    - Dr. GH. M. ARZO, responsible of the laboratory
    - Dr. M.S. TAHIR, Livestock sector co-ordinator
    - Dr. N. SAÏFI

PESHAWAR – PAKISTAN

- **MADERA – PESHAWAR**
    - Dr. Jean-François CAUTAIN, Country Director

- **FAO – ISLAMABAD**
    - Dr. A. B. MEHRABAN, National manager
    - Dr. A. A. MAJOK, Epidemiologist

- **GERMAN AFGHANISTAN FOUNDATION**
    - Dr. ABDUL GHA FOOR, Director

IV - ACKNOWLEDGMENTS

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The consultant is really deeply grateful to the whole staff of the ICRC delegation in KABUL and especially to MARKUS DOLDER and RODERICK CHARTERS for their warmful welcome during his stay in AFGHANISTAN.

Many thanks to Dr. A.H. NAWROZ, representative of ICRC and supervisor of the vaccine production Laboratory in KABUL, and to all the staff of technicians of this laboratory for their friendly and active collaboration during his mission.

Thanks too to the ICRC people of JALALABAD, PESHAWAR and ISLAMABAD for their excellent welcome service during the journey.

V - GENERAL CONTEXT OF LIVESTOCK IN AFGHANISTAN

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- **85 %** of the total population **is involved in agriculture.**

- According to different sources (MOA, FAO, MADERA) the **number of animals** should be in **1996-1997** as following :

  - Cattle : 3 to 3.5 million (including 40,000 buffalos)
  - Sheep : 15 to 20 million (including 4 million karakul)
  - Goats : 3 to 5.5 million
  - Horses : 300,000
  - Donkeys : 3 to 600,000
  - Camels : 130 to 150,000
  - Poultry : 15 to 20 million

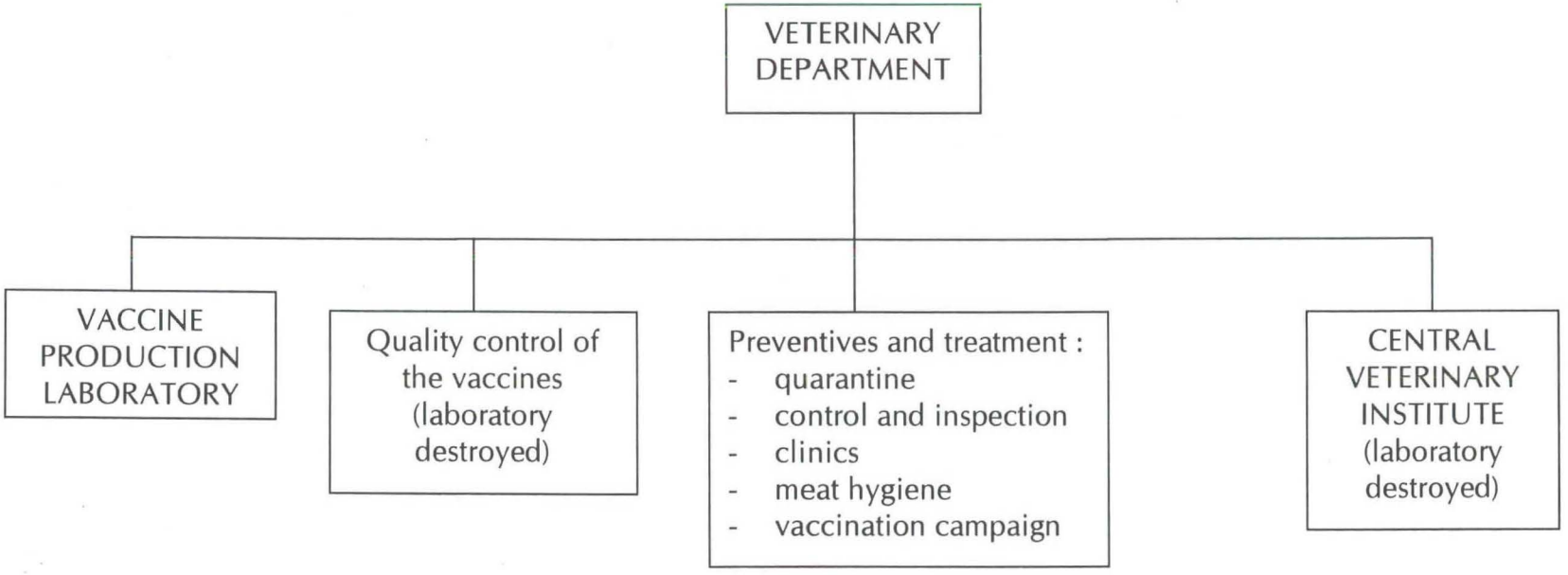
Sheep, cattle and poultry are the main species for animal production in Afghanistan.

- Number of professionals involved in animal health in Afghanistan :

  - Veterinarians : 400 (educated in the veterinary faculty of KABUL)
    100 (educated abroad)
  - Vet-assistants : 900

- **Chart of the veterinary department of the Ministry of Agriculture of Afghanistan (MOA)**

CHART OF THE VETERINARY DEPARTMENT OF THE MINISTRY OF AGRICULTURE OF AFGHANISTAN (MOA)



- **Partners involved in animal health and production** :

- ICRC
  - vaccine production (KABUL)
  - clinics
  - husbandry
- MADERA :
  - vaccine production (JALALABAD)
  - clinics
- D.C.A. :
  - clinics
  - training
- F.A.O. :
  - clinics,
  - veterinary training centre,
  - animal husbandry,
  - diagnostics labs (4)
  - meat inspection (limited)
  - artificial insemination (limited)

- **The ICRC delegation (Eco-Sec co-ordinator) in KABUL started 2 years ago a vet. Programme** with, mainly, a **support to the vaccine production laboratory in KABUL** and to 2 veterinary clinics.
  This programme is situated in the general framework of strengthening the **food chain**, insuring animal production by the **improvement of livestock health.**

VI – PRESENTATION OF THE STAFF OF THE VETERINARY VACCINES PRODUCTION LABORATORY IN KABUL

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- **5 veterinary assistants and laboratory technicians :**

  - Mean age of the staff : **50 years** with **29 years** of experience for each.

  - Education :

    - **3 years** in the veterinary high school of KABUL
    - **2 years and ½** in the institute of agriculture and technical training
    - **1 year** of specific training in KABUL sponsored by FAO, entitled "Laboratory technicians training course"
    - In addition the 5 technicians obtained grants for specialized training in foreign countries :
      - 2 technicians 6 months in RAZZI Institute Teheran (IRAN) and 3 months in India (I.V.R.I. IZATNAGAR) for viral vaccines : Newcastle disease, Fowl-pox, Sheep-pox, rinderpest (tissue cultures)
      - 1 technician 6 months in the SOFIA Institute of Immunology (BULGARIA) for Anthrax and Haemorrhagic septicaemia vaccines production,
      - 1 technician one year in Czechoslovakia for blackleg,
      - 1 technician 6 months in India (IVRI – IZATNAGAR) for Anthrax, Blackleg, multicomponent clostridial vaccines.

- **Dr. A.H. NAWROZ**

  - Representative of ICRC and supervisor of the vaccine production laboratory in KABUL
  - B.V.sc. (5 years), M.V.sc. (3 years) India. Title of the thesis : "Detection of rinderpest Antibodies by micro-Elisa techniques".
    National diploma (eq) INDIA Training in microbiological diagnostic (9 months),
  - Genetic engineering and tissue culture training (INDIA) (3 months),
  - Trained for Anthrax, haemorrhagic septiceaemia vaccines and salmonella pullorum colored antigen production.

- **Mean age of the staff of the laboratory :**

  - Approximately 50 years around : **it is necessary to plan specialized training for new technicians in the future.** Young technicians and veterinarians are available in the country to renew the staff (?)
  - But no education since 1992
  - It seems it has started again in 1999 in the veterinary faculty of KABUL.
  - All these technicians have received a really **good education** and **good trainings** in the past. They have a **long experience**. The consultant confirms their standard technical competences for benches work. However, **some refreshing courses** should be necessary to update their present skills.

VII – REVIEW OF THE ANTHRAX VACCINE PRODUCTION PROCESS

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VII-1 – CHECK OF THE DIFERRENT STEPS OF THE PROCESS

During his stay in KABUL, the consultant has checked in details the achievement of the following protocols :

- Sheep blood collection,
- Preparation of nutrient agar, blood agar, and Robertson medium
- Bacterioscopy of the 34 F_2 strain (gram staining, lack of motility and of haemolysis),
- Purity controls for all steps,
- Seed culture preparation inoculation and control,
- Inoculation and collection of the mass culture in Roux flaskes with glass beeds,
- Saponine saline preparation,
- Dilution of the concentrate in a saponine solution,
- Viable spores count,
- Dispensing of the vaccine,
- Safety controls on guinea pigs and sheep,
- Laboratory skills of the staff .

For the consultant, all the technicians apply, in general, **the standard methods used in bacteriology** for such a production.

VII-2. COMMENTS AND TECHNICAL RECOMMENDATIONS

VII-2.1. Sterne strain 34 F_2 of Bacillus anthracis :

- **History of this strain**

The **worldwide strain** currently used for prevention of Anthrax in animals **was developed in 1937** by Sterne in South Africa.
He discovered a **rough avirulent variant** of Bacillus anthracis when grown in serum agar with increased Co_2. This variant was **incapable of forming a capsule.** It is a **one-way mutation which cannot revert back** to the **encapsulated state. Sterne** proposed **this avirulent strain, termed "34F_2 STERNE", for Anthrax vaccine production. More than 35 worldwide producers** of this vaccine, **including the veterinary vaccine production laboratory in KABUL, use this avirulent, immunogenic strain.**

- **Specific bacteriological characteristics of this strain :**

  - Bacilli,
  - Square ended, single or usually in long chains,
  - **Gram +**

- **Non motile**,
- **Non encapsulated**,
- Forming ellipsoïdal, central non bulging **spores**,
- Vegetative cells are large (3-6 µm in length, and 1.0-1.2 µm in width),
- **"Rough"** colonies,
- **Lack of haemolysis**
- **Avirulent** for guinea pigs, sheep, goats and cattle in particular.

◆ **Master seed bank in the laboratory of KABUL :**

- **Only 2 vials** remaining provided in 1993 by the Razzi Institute (Teheran–IRAN),
- **Seed cultures** : in deep agar, kept 2 or 3 months in the fridge,
- Only 20 batches of 300,000 dosis each (**6 million dosis**) can be manufactured in the future from the 2 vials available currently.

◆ **Recommendations :**

- **Immediatly renew the stock of strains to secure the future productions.** Different sources possible :
  - If possible, **laboratories in Turkey, India, Indonesia** should provide new vials through FAO,
  - If not, the best recommendation is to obtain the original strain from the **"WHO/FAO International laboratory for biological standards",** CVL Wey bridge, New Haw, Addlestone, Surrey, KT 15 3 NB, United Kingdom.
- A large seed lot must be prepared from the parent strain and preserved by **lyophilisation.**

VII2-2. MICROSCOPY

◆ **1 microscope** available with : x 10, x 40 and x 100 (oil immersion),
◆ **7 years old** (Ningguang Trade mark),
◆ **No phase contrast outfit** (necessary to check the motility)
◆ **Complete revision of this microscope is absolutely necessary by a specialized** workshop,
◆ **Purchase of a new microscope** is advised
◆ Gram staining : the stock of reagents must be renewed.

VII-2.3. MASS CULTURE MEDIUM

◆ The KABUL's laboratory prepares currently the following medium :

- Bacto nutrient agar dehydrated (bacto beefxtract, bacto peptone, bacto agar) : 23 g/1000 ml,
- 0,5 % sodium chloride
- final pH : 7.2.

◆ **An improvement of the medium is proposed : in addition to the current medium use addition per 1000 ml of medium :**

- **An improvement of the medium is proposed : in addition to the current medium use addition per 1000 ml of medium** :

  - **Yeast extract** (DIFCO) 2 g
  - **Potassium di hydrogen phosphate** 1 g
  - **Di potassium hydrogen phosphate** (as buffer) 5 g
  - PH 7.2.

VII-2.4. Mass culture in Roux flasks :

- Currently : - 4 days in incubator
  - 3 days in dark-room

- Recommendations :
  - **Control the evolution of the sporulation by bacterioscopy each day**
  - This control should allow to **reduce to 2 to 3 days instead of 4 days necessary to obtain 90 % of sporulation.**
  - Remove the remaining liquid seed cultures in the Roux flasks after some hours of incubation to get a better and faster sporulation.
  - Advice : place the concentrate 1 h 65° in a water bath to eliminate the vegetative cells.

VII-2.5. Dilution of the concentrate to prepare the final batch of vaccine

- Currently performed in saline with saponine
- Recommendations :
  - To extend the conservation of the spores, **glycerine** should be used by dilution of the concentrate in a equal weight of glycerine
  - However glycerine is very expensive at this stage of production (should increase the cost 2 times)
  - The final concentration of **saponine can be reduced to 1 ‰ instead of 2.5 ‰** currently, if some important **side effects are reported** in the field (specially for goats).

VII-2.6. Batch control and tests on the final product

VII-2.6.1. Purity test

- The media currently used are :
  - blood agar)
  - nutrient agar) kept at 37 ° c
  - nutrient broth)
  - Robertson medium)

  - sabouraud agar) kept at room temperature

The duration **of incubation should be extended to 14 days** according to international standard.

VII-2.6.2. Viable spores count

- **During the stay of the consultant a spores count process was performed** : 5 petri dishes were inoculated with 0.1 cc of the Anthrax vaccine concentrate at the dilution of 10^{-7}
- The results were as follows :
  - Petri dish n° 1 → 34 colonies
    2 → 16 "
    3 → 17 "
    4 → 13 "
    5 → 11 "

    TOTAL 91 colonies for 0.5 cc of concentrate
  - **The final viable spores count** is : 91 x2 x 10^7 = **182.10 ^{7} spores**/ml of concentrate
- Comments : it is considered as a **good score**. The average score is around **150-10^7 spores/ml of concentrate.**
  - The standard number of spores in the final product is **1.10 ^{7} spores/ml (1 cattle doses).** It is advised to adjust the dilution of the concentrate over the number of spores required, which means **1.1 to 1.2 10 ^{7} spores/ml.**

VII-2-6.3. Safety tests :

- **Guinea pigs**
  - They are used only for the control of the concentrate
  - 1 ml of concentrate is diluted in 4 ml of normal saline (dilution 1/5)
  - 2 Guinea pigs are injected by the subcutaneous route respectively with 0.5 ml and 0.2 ml of the diluted concentrate and observed during 7 days.

- **Sheep**
  - They are achieved on 3 non vaccinated sheep/batch inoculated respectively with 0.5 ml, 1 ml, 5 ml of the final product (sampling : 1 % of the dispensed bottles) by the subcutaneous route.
  - Temperature is recorded twice a day, 3 days before vaccination, and during 15 days after injection.

- **No comments : these tests are following the standard requirements.**

VII-2-6.4. Potency tests

- No potency tests performed currently in this laboratory on guinea pigs
- In routing production these tests are not considered as absolutely necessary for the well known 34 F_2 strain vaccine.

- In routing production these tests are not considered as absolutely necessary for the well known 34 F_2 strain vaccine.

VII-2.7. Proposal for an external official control of the Anthrax vaccine currently produced

- The KABUL laboratory performs currently all the tests above mentionned and introduced the consultant the **control forms for each batch manufactured** (see **Appendix 1**).

- During the second semester of 1998, Anthrax vaccine samples were sent to the **veterinary research Institute of PESHAWAR (Pakistan)** for an external control : the vaccine batch submitted to this control passed the tests of purity, safety, spore count performed, see results in **Appendix 2**.

- However, it is advised by the consultant to handover vaccine samples of a current vaccine batch for an **official control to the FAO/PANVAC Laboratory in DEBRE-ZEIT (Ethiopia)** to perform, once, a complete testing of the Anthrax vaccine manufactured in KABUL (viable spores count, purity, safety, potency tests).

- With the agreement of the ICRC delegate in KABUL, the consultant has carried two bottles of a new Anthrax vaccine batch back to France, and will handover immediately to the FAO/PANVAC-Laboratory.

- References of this laboratory :

PAN AFRICAN VETERINARY VACCINE CENTER (PANVAC)
C/o FAO – P.O. BOX 5536
ADDIS-ABABA (Ethiopia)
Tel : 00 251-1 33 88 44
Fax : 00 251-1 33 80 01
e.mail : panvac@telecom.net

- The cost of a complete control is : 700 US $ (see an estimate from PANVAC in **Appendix 3**).

VII-2.8. Storage of the final vaccine

- Maximum 6 months
- The vaccines are **currently stored** in **an air-conditioned room located in the ICRC Delegation in KABUL.**
- According to the standards, it seems necessary to **implement** a **cold room (+ 4°C) directly in the laboratory.**

VII-2.9. Reminder : duration of immunity

- A single inoculation provides effective immunity for about **nine months.**
- Effective immunity develops **within a week of vaccination**
- An **annual booster dose is adequate** to ensure permanent immuno-protection.

VII-2.10. Reporting on the Anthrax vaccine produced by the KABULS's laboratory

- Two batches manufactured equivalent to **850,000 sheep doses** : they passed the purity and safety tests (sheep)
- They have been dispatched as follows :

• 5,000 doses :	Ministry of Agriculture (Vet.Clinics)
• 200,000 doses :	Ministry of Agriculture (Vet.Clinics)
• 200,000 doses :	FAO (Afghanistan)
• 20,000 doses :	VET-CLINICS (ICRC)
• 344,000 doses :	FAO (Afghanistan)
• 40,000 doses :	Ministry of Agriculture

TOTAL : **809 000 doses dispatched**

- 1st batch : Free of cost
- 2nd batch : 344,000 sheep doses bought by FAO (0,25 PKR/doses) corresponding to **1,650 US $ around = 4,800 US $** 1 million doses

VIII – GLOBAL NEEDS OF VETERINARY VACCINES FOR AFGHANISTAN

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- **Brief history of the veterinary vaccines production in Afghanistan :**

  - Since **1944, Rinderpest vaccines** (lapinized, caprinized, freeze-dried) have been produced in Afghanistan with the support of **FAO**.
  - Between **1971-1977**, the French government funded the establishment in KABUL (GARGHA) of a **PASTEUR INSTITUTE** which produced human and veterinary vaccines (sheep-pox, fowl pasteurellosis, enterotoxemia, haemorrhagic septicaemia, anthrax, newcastle).
  - All productions **stopped in 1992** and **restarted in 1997-1998** (Madera and the laboratory of KABUL).

- **Estimated needs of vaccines :**

Considering different sources of information (FAO, MOA, MADERA...) and taking in account the present competences of the two existing laboratories (KABUL, MADERA), three levels of priorities are identified :

Priorities	Vaccines	Needs/year
1	ANTHRAX	15 to 20 million doses (all ruminants)
2	ENTEROTOXEMIA	4 million doses
	BLACKLEG	1 million doses
	HAEMORRHAGIC SEPTICAEMIA	500,000 doses
	CCCP	150,000 doses (?)
3	NEWCASTLE DISEASE	5 million doses
	SHEEP POX	1 million doses
	PPR	1 to 3.5 million doses
	FOWL POX	?
	GUMBORO	?

- Comments :

  - The production of **anthrax vaccine** is the **"number one" priority** considering that it is a zoonotic disease ! 23 human cases reported in 1997 and 20 in 1998 by the infectious diseases hospital in KABUL,
  - **Anaerobic vaccines** (Blackleg – Enterotoxemia) are important for all ruminants (cattle, sheep and goats).
  - **Newcastle disease vaccine** :
    - **8 millions of doses** are imported illegally (from Pakistan) , each year ; this situation is not satisfactory, because the cold chain is not respected the vaccines are very often contamined.
    - In January 1999, for instance, 24,000 young layers died of this disease in 20 poultry farms around KABUL.
    - In the district of KABUL, **900 breeders** are implemented. They need **2 million doses** of this vaccine per year.

IX – GENERAL STRATEGY PROPOSED FOR THE LABORATORY OF KABUL

IX – GENERAL STRATEGY PROPOSED FOR THE LABORATORY OF KABUL

- Because of political uncertainties in Afghanistan and for technical security reasons, it is proposed to **set up the bacterial vaccine processes in the 2 laboratories (KABUL, JALALABAD).**

- For KABUL the consultant proposes 3 steps :

  - To strengthen immediately **the anthrax vaccine** production,
  - To implement, as soon as possible, the production of the **enterotoxemia and blackleg vaccines.**
  - To get ready to set up the **Newcastle disease** vaccine process followed by the **PPR vaccine which require new refurbished facilities specific for the viral vaccines production.**

X – FUTURE PROSPECTS FOR THE PRODUCTION OF BACTERIAL VACCINES IN THE LABORATORY OF KABUL

X – FUTURE PROSPECTS FOR THE PRODUCTION OF BACTERIAL VACCINES IN THE LABORATORY OF KABUL

X-1. ESTIMATE FOR LABORATORY EQUIPMENTS :

To fulfill the first 2 steps (bacterial vaccines) it is necessary to provide the following equipments :

▪ **One horizontal cylindrical autoclave** with a capacity of 8 flasks of ten liters on 2 shelves (2 x 4)	**40,000 US $**
▪ **One bench freeze dryer**	**12,000 US $**
▪ **One laminar air flow cabinet** (with a manometer for differential pressure)	**10,000 US $**
▪ **One microscope** (with different objectives and a phase contrast device)	**5,500 US $**
▪ **One de ionizer**	**4,000 US $**
▪ **One conductimeter**	**1,000 US $**
▪ **One centrifuge** (top speed 4,000 RPM for 10 ml tubes maximum).....	**3,500 US $**
▪ **One hot air oven**	**1,500 US $**
▪ **One anaerobic jar with gas packs**	**500 US $**
▪ **One stop watch timer**	**60 US $**
▪ **One shaker-mixer** (auto vortex)	**300 US $**
▪ **One stabilizer** (for the laminal air flow cabinet or the microscope)	**200 US $**
▪ **One digital balance** (0.1 to 100 g minimum)	**800 US $**
▪ **One Ph meter** (with buffer solutions ph 7 and 4	**300 US $**
▪ **One stainless steel bucket**	**90 US $**
▪ **One water bath**	**1,500 US $**
▪ **One capping and decapping machine** (including jaw devices)	**1,500 US $**
▪ **Two magnetic stirrers** (for two items) - for dispensing (10 liters volume) - for laboratory use (1 liter volume)	**900 US $**
▪ **Stirring bars** (different sizes)	**50 US $**
▪ **On vacuum pump**	**600 US $**
▪ **One mincing machine**	**1,300 US $**
▪ **One seitz filter** (2 liters capacity)	**2,500 US $**
▪ **Five bunsen burners** (for 5 pieces)	**250 US $**
▪ **One computer + printer**	**1,500 US $**
▪ **One stand-by generator** 5-10 KVA	**1,500 US $**
▪ **Different glass wares and miscellaneous** including pipettes, conical pyrex, petri dishes, balloons, disposable syringes and needles, funnels hot air oven indicators, canisters, glass beads, rubber stoppers, aluminum caps	**5,000 US $**
▪ **SUB-TOTAL :**	**96,350 US $**
▪ + 30 % for transportation from EUROPE to AFGHANISTAN	**28,900 US $**
▪ **GRAND TOTAL**	**125,250 US $**

N.B. - It is advised to **buy directly in Europe** through ICRC (Geneva) with **direct transport Europe-Afghanistan** (not through Pakistan because of customs taxes),
- **purchasing in Pakistan through local companies should cost 2 to 2.5 more** !!

◆ See **technical specifications for laboratory equipments** from BDH-MERCK catalogue in **Appendix 4.**

X-2. ESTIMATE FOR THE REFURBISHEMENT OF THE PRESENT FACILITIES

- For the production of **bacterial vaccines** (anthrax, enterotoxemia, blackleg) it should be necessary to refurbish some **new rooms within the existing surface of laboratories** devoted at the moment exclusively to the production of the anthrax vaccine.

- The new complete list of rooms is the following :

Main entrance

Head office *		Central corridor	Washing and sterilization room	
Technicians' office			* Store	
			WC	
Packing room			Dispensing room	
	* Cold room for anthrax final vaccine 30 m^3		Walk-in incubator 30 m^3*	
Media preparation room			* Culture room (enterotoxemia blackleg)	
Culture room (anthrax + HS)				

*New rooms

- Another **preparation room** for **anaerobic media** called "boiling room" will be located outside, within the compound in a **container.**

- **General estimate for the rehabilitation work** :

• Additional refurbishment of the new rooms :	**5,000 US $**
• Windows glasses :	**1,000 US $**
• Linoleum : 165 m^2 :	**1,000 US $**
• Waste drainage :	**500 US $**
• Glass wool for insulation (cold room and walk-in incubator)	**1,000 US $**
• Thermoregulation equipment (walk-in incubator)	**4,000 US $**
• Refrigeration equipment (cold room)	**4,000 US $**
TOTAL	**16,500 US $**

- See in **Appendix 5**, for information, a cost estimation drawn up by A. MEISSMER/ICRC-constructor KABUL on the 21/07/1998.

X-3. CALCULATION OF THE PRODUCTION COSTS :

- Reminder : inventory of the existing chemicals and equipements in the laboratory of KABUL introduced by Dr. NAWROZ. See in **Appendix 6.**

- **Estimated production costs :**
  Taking in account informations from the technicians staff

  - **Anthrax vaccine :** 1 millions doses : (sheep doses : 0,5 ml) — 2,500 US $
  - **Enterotoxemia vaccine :**
    - 1 million doses monovalent vaccine : (sheep doses : 1 ml) — 5,000 US $
    - 1 million doses bivalent vaccine : (sheep doses : 2 ml) — 10,000 US $
  - **blackleg vaccine :**
    - 1 million doses monovalent vaccine : (sheep doses : 1 ml) — 4,000 US $
    - 1 million doses bivalent vaccine : (sheep doses : 2 ml) — 8,000 US $

- **See protocols of production of the different bacterial vaccines** in KABUL in **Appendix 7** (drawn up by Dr. NAWROZ).

X-4. FEASIBLE ANNUAL BACTERIAL VACCINE PRODUCTION IN KABUL

For the first year (should be increased later)

- **Anthrax :** **5 million** doses
- **Enterotoxemia :** **1.5 million** doses (bivalent)
- **Blackleg :** **1 million** doses (bivalent)
- **Haemorrhagic septicaemia :** **500,000** doses

X-5. TRAINING

- To renew the staff it seems more adequate to take on **veterinary doctors** rather than technicians.

- **Upgrading in microbiology** is necessary : general courses (1 year)

- **Specialized training** for vaccine production recommended abroad (bacterial and viral vaccines).

XI – PRELIMINARY PROPOSAL FOR A NEWCASTLE VACCINE PRODUCTION UNIT IN THE LABORATORY OF KABUL

XI – PRELIMINARY PROPOSAL FOR A NEWCASTLE VACCINE PRODUCTION UNIT IN THE LABORATORY OF KABUL

- **New laboratories are necessary :**

  - dispensing room
  - incubation room
  - inoculation room
  - Freeze drying room
  - Deep freezer room
  - Office

- **Additional equipments :**

• Eggs incubation (300 eggs)			**1,500 US $**
• Freeze dryer			**35,000 US $**]
500 vials (5 ml)		to	**40,000 US $**]
• Deep freezer			**700 US $**
• Laminar air flow cabinet :			**10,000 US $**
• Tester for vacuum in ampules :			**300 US $**
• 8,000 rubber stoppers	)		
• 8,000 aluminum caps	)		**1,000 US $**
• 1,500 embryonated eggs	)		

TOTAL : 48,500 to 53,500 US $ (1st year)

- **Production : 3 million doses/year 1st year**

  - In ampules : 100 doses
    Vials : 400 doses (5 ml)

  - 200,000 doses / batch
  - **16 batches / year : 3 million doses**

- See protocols of production of different viral vaccines in **Appendix 8** (drawn up by Dr. NAWROZ).

XII – VISIT TO THE MADERA VETERINARY VACCINES PRODUCTION LABORATORY JALALABAD (Afghanistan)

XII – VISIT TO THE MADERA VETERINARY VACCINES PRODUCTION LABORATORY JALALABAD (Afghanistan)

EU project : Production launched in october 1997

- The consultant did a **short visit** : no commitment for an evaluation of this laboratory

- **LABORATORY** :
  - "Basic" facilities and equipment, unsuitable environment (no protection for contaminations).
  - Animal husbandry close to the dispensing and incubation room
  - Good store : a lot of consumables (chemicals, peptones, glass wares) necessary for the production.

- **Anthrax vaccine production :**
  - Seems to be in agreement with the international standards
  - F 34 Sterne strain freeze-dried (from LAHORE – PAKISTAN and from IRAN)
  - Same process as in KABUL for :
    - production (Roux flasks)
    - control (purity, safety, spores account)
    - Average for concentrate **150 10 ^{7}/ml = correct**
  - **Vaccine : free of charge**

- **Blackleg vaccine : Ch. Chauvoei only**
  - **Strain :** Lahore/freeze dried + Afghan
  - **Process :** classic : potency test : guinea pig
  - Vaccination challenge
  - **No septicum vaccine production.**
  - **Enterotoxemia vaccine :** classic process
    - Cl. Perfringens type B and D
    - Alum hydroxide precipitation (10 ‰)
  - **CCPP vaccine** : F 38 strain
    One batch only
  - **No viral vaccine production planned in the near future**
  - **Present annual capacity of the MADERA laboratory**
    - **Anthrax :** 5 million doses/year
    - **Enterotoxemia :** 400,000 " "
    - **Blackleg :** 500,00 " "
    - **H.S.V. :** 200,000 " "
    - **CCPP :** 150,000 " "
  - **Staff :**
    - 2 veterinarians
    - 4 laboratory technicians : same level as in KABUL
    - 3 assistant technicians
  - **Anthrax vaccine** : Control in the PESHAWAR research veterinary institute : same as KABUL
  - See in **Appendix 9** a brief report introduced by Dr. ARZO on the bacterial vaccines production in this laboratory.

XIII – REPORT OF THE FINAL MEETING IN PESHAWAR (PAKISTAN)

XIII – REPORT OF THE FINAL MEETING IN PESHAWAR (PAKISTAN)

This meeting was held in the MADERA Office in PESHAWAR on the 8th of April 1999 with representatives of FAO (ISLAMABAD), MADERA (PESHAWAR), ICRC (KABUL).

The participants agree to consider that **2 veterinary laboratories manufacturing the same bacterial vaccines are necessary in Afghanistan** to partially secure the needs, taking in account the present situation of the country.

A shared production planning should be as follows for the **first year** :

Vaccines	Estimated needs of Afghanistan	M.O.A. KABUL Laboratory	MADERA JALALABAD Laboratory
Anthrax	15-20 million doses all ruminants	5 M	5 M
Blackleg	1 M	1 M	500,000
Enterotoxemia	4 M	1,5 M	400,000
Haemorrhagic-septicaemia	500,000	500,000	200,000
CCPP	150,000		150,000
Newcastle	5 M	3 M	
Sheep-pox	1 M		

The FAO representatives declare that :

- **FAO is a potential client** :
  See a letter from FAO dated 8/11/1998 to ICRC and MADERA confirming annual requirements for vaccines in **Appendix 10.**

- **Cattle are important for the economy of Afghanistan**

- **PPR vaccine is a priority :**
  - This disease has been identified in **42 districts** in the country. See data of a sero-monitoring survey in Afghanistan by FAO in **Appendix 11.**
  - **1 to 3,5 million of doses** of the homologous vaccine are requested.
  - Currently, PPR vaccines are imported in Afghanistan from Jordan by FAO.
  - **FAO strongly support a possible local production of this vaccine** in the MOA Laboratory in KABUL.

- The consultant informs the participants that **Dr. Adama DIALLO** (CIRAD-EMVT Montpellier), FAO and OIE PPR-expert, can give, on request, technical assistance for a **transfer of technology** in Afghanistan **of the PPR homologous vaccine production process.**

- **Final remark on the shelf life of Anthrax vaccines** :
  - It is **limited to 6 months**,
  - The manufacturing laboratories need to have a **schedule** of field dispatching from FAO to establish a **coordinated production planning between the 2 laboratories.**

XIV – CONCLUSION

XIV – CONCLUSION

XIV – 1. The consultant considers that for the **Anthrax vaccine production process** performed in the MOA Veterinary Laboratory of KABUL, **the competence of technicians are good** and the **production protocols are, in general, standard**, referring to the OIE requirements for this vaccine described in the **OIE Manual of Standards for Diagnostics Tests and Vaccines 1996.**

XIV – 2. However, the **technical recommendations** in this report for the Anthrax vaccine production have to be reconsidered, and the **final appraisement of this vaccine will be transmitted by the consultant to ICRC** regarding the official testing of two samples (50 ml) of the Anthrax vaccine produced in KABUL in process in the **PANVAC/FAO Laboratory** of Debre-Zeit (Ethiopia).

The two samples have been handed-over by CIRAD-EMVT at the end of the present mission for the following testing :

- purity,
- spores count,
- safety (guinea-pigs, small ruminants)
- efficacy (guinea-pigs)

XIV – 3. To comment on the "touchy" problem attached to the term "Anthrax" the **correspondence addressed by the Chief of the veterinary department to ICRC of the MOA in KABUL** (see in **Appendix 12**) has to be considered. On the other hand, **anyone, in any country can divert the vaccine production for "a malicious use"** isolating a virulent strain directly for the soil or from necropsied animals.

XIV – 4 On the other hand, to fulfill the standard operating procedures (SOP) and to extend the production to some other bacterial vaccines, **the improvement of the environment** of the MOA Laboratory is **absolutely necessary** :

- **Complementary refurbishment** of the laboratory room has to be achieved,
- **New equipment** must be provided
- The permanent and sufficient **stock of consumables** has to be secured.

XIV – 5. As described in Chapter XIII it is advised to strengthen in parallel production of the bacterial and viral veterinary vaccines needed for livestock, **on two sites** :

- **M.O.A. Laboratory** (KABUL)
- **MADERA Laboratory** (JALALABAD)

XIV – 6. To conclude, the consultant would like to highlight **one major problem**, the different partners involved in veterinary vaccines production in Afghanistan will face, inevitably in the near future : that is clearly the **financial management** of the MOA Laboratory in KABUL to improve its capacity building. This structure has to move, step by step, from the present status of complete support by ICRC to **self sustainability** in the frame of a **cost recovery system.**

The implementation of a **steering committee** previously proposed with the participation of ICRC, FAO, MADERA, Afghanistan Veterinary Association, MOA, will be very helpful in this context.

XV – BIBLIOGRAPHY

XV – BIBLIOGRAPHY

During the stay in KABUL, the consultant has transmitted some scientific articles to Dr. NAWROZ, mainly on Anthrax and PPR.

See in **Appendix 13**

APPENDIX 1

CONTROL FORMS (KABUL LABORATORY)

Date. 11-2-98
Lot. No 1
Strain 34 F2

Name of vaccine Anthrax spore vaccine

Date of seed culture 12.2.1998

Date of mass culture 13.2.1998

Date of formalisation (bacterins).....

Date of Harvest 22.2.1998

Date of 1st guinea pig test 14.3.98

Date of 2nd guinea pig test .....

Date of spore count 13.3.1998

No spore /ml 370.000.000.0

possible doses of vaccine 434.000

Date of final spore count 20.3.1998

Date of sterility test 19.3.1998 Result satisfactory

If repeated .....

Date of safety test 21.3.1998 Result satisfactory

Lot produced by A. Wakil Assisted by

Lot tested by A. Wakil A. Samad
A. Ahad
Ali Mohammad
A. Rab

Date of dispatch 10 April 1998

TEMPERATURE CHART

TEST / BEACH NO: Reh. GG 1

Animal spece : Goat Breed : Native Age : 2 yr

Sex : Famale Marking : Black with short Horn

Date of inoculation : 8-6-98 Time : 4 pm (1)

With Strain : 34 F2 Anthrax Method of Inoculation : S/C

Amount of ilnoculum : 0.5 ml

Month B.V 8-6-1998 June

Date	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Hour	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p

Remarks

Autopsy

Finding in followings organs

43 C
42 C
41 C
40 C
39 C
38 C
37 C
36 C

.8 .6 .4 .2

Local lesion

Liver

Heart

Lungs

Spleen

Kidneys

Stomach

Intestine

pm

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

(STILL ALIVE), (DIED), (FILLED) ON : _____

47

NOte: Due to lack of fifty ml bottles this portion ~~remin~~ Remained undispensed. After dispensing a separate quality test was conducted.

TEMPERATURE CHART

TEST / BEACH NO: Reh-GG 1

Animal spece : Goat Breed : native Age : 2 yr

Sex : famale Marking : white forhead ~~and~~ with Horn.

Date of inoculation : 8-6-98 Time : 4 pm

(11)

With Strain : 34 F2 Anthrax Method of Inoculation : S/C

Amount of ilnoculum : 1 ml

Month B.V 8-6-1998 June.

Date	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Hour	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p

Remarks

Autopsy

Finding in followings organs

Local lesion

Liver

Heart

Lungs

Spleen

Kidneys

Stomach

Intestine

C .8 .6 .4 .2

p.m

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

(STILL ALIVE), (DIED), (FILLED) ON : _____

TEMPERATURE CHART

TEST / BEACH NO: reh-GG1

Animal spece : Goat Breed : Native Age : 3 yr

Sex : Famale Marking : Black with white ear

Date of inoculation : 8-6-98 Time : 4 pm

With Strain : 34 F2 Anthrax Method of Inoculation : S/C

Amount of ilnoculum : 5 ml

(111)

Month B.V	8·6·98	June														Remarks
Date	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Autopsy
Hour	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	a p	Finding in followings organs
43 C																
.8 .6 .4 .2																Local lesion
42 C																
.8 .6 .4 .2																Liver
41 C																
.8 .6 .4 .2																Heart
40 C																
.8 .6 .4 .2	pm															Lungs
39 C																
.8 .6 .4 .2																Spleen
38 C																
.8 .6 .4 .2																Kidneys
37 C																
.8 .6 .4 .2																Stomach
36 C																
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Intestine

(STILL ALIVE), (DIED), (FILLED) ON : _____

APPENDIX 2

RESULTS OF A CONTROL OF AN ANTHRAX VACCINE BATCH EXECUTED IN PAKISTAN

VETERINARY RESEARCH INSTITUTE
NWFP, PESHAWAR

NO.DVRI/Stand/B.P.Division/ 4098 Dated Peshawar the 12.10.1998

To

Dr. Mehraban
Deputy Project AFG/96/009
House 4, Str.4, G-6/3
Islamabad.

Subject: STANDARDIZATION/QUALITY CONTROL OF A.S.V. PREPARED BY ICRC KABUL

Please refer to the subject cited above.

The Anthrax Spore Vaccine bottle of 50 ml glass packing received from you on 25.9.98 was processed as under:-

1. Contamination Control

Blood agar, MacConkey's agar, Tryptose agar and Saboraud dextrose agar were cultured with various dilutions of the sample. Saboraud dextrose agar plates were incubated at 30°C for 96 hours while the rest of the media plates and tubes were incubated at 37°C for 48 hours. No contamination was detected.

2. Laboratory animal inoculation

Two albino mice and two guinea pigs were inoculated with 0.25 ml and 0.5 ml intraperitoneally respectively. These animals were kept under observation for ten days. No untoward reactions or symptoms were observed.

3. Sporulation Control

Ten fold dilutions upto 8 were made in normal saline and the tubes were placed at 70°C for 30 minutes to eliminate vegetative bacilli. Pour plate method was employed for the estimation of viable spore count. Nutrient agar was used. Average spore count was 10 million spore per ml.

The Anthrax spore vaccine could not be tested in sheep/goat due to non availability of the same at the moment.

Opinion: The vaccine sample is free from any contamination and proved quite safe in lab. animals. The average spore count is 10 million spore per ml.

(DR. MASHOOQ ALI)
SRO(BP)
for Director

APPENDIX 3

PANVAC ESTIMATE FOR A COMPLETE OFFICIAL CONTROL OF ONE ANTHRAX VACCINE BATCH

99-64
-2 AVR. 1999

Pan African Veterinary Vaccine Centre (PANVAC)

Debre Zeit, Ethiopia
C/O FAOR in Ethiopia
P.O.Box 5536 , Addis Ababa

Tel 251-1-338001
Fax 251-1-338844
panvac@telecom.net.et

FACSIMILE TRANSMISSION

vendredi 2 avril 1999

Au: **Dr Tulasne**
CIRAD-EMVT en mission à Kaboul : Fax : 873-382 280 133

DE: Dr B.M. Seck
Conseiller Technique Principal, PANVAC

OBJET: **Coût du contrôle de la qualité du vaccin anti-charbon bactéridien**

Cher Collègue,

En réponse à vos 2 messages fax relatifs au sujet susmentionné, j'ai l'honneur de porter à votre attention que le coût de ce contrôle s'élève à 700 dollars US (Sept cent dollars US). Ce contrôle comprend les tests suivants :

- pureté,
- identité
- puissance (dénombrement des spores)
- innocuité
- et efficacité.

Veuillez agréer, cher collègue, l'expression de mes meilleurs sentiments.

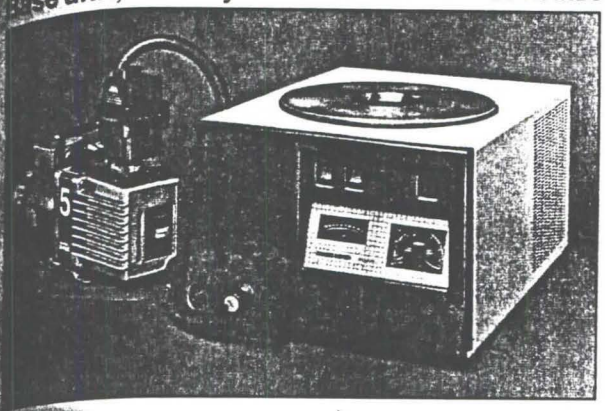
Dr B.M. Seck

CC :
Mme Bastron, EMVT, Fax : 33- 4 67 59 37 95

APPENDIX 4

TECHNICAL SPECIFICATIONS FOR LABORATORY EQUIPEMENTS

...e unit, Modulyo EDWARDS



...esigned for safety and simple operation

...deal for freeze drying biological and ...harmaceutical preparations

...its on an average laboratory bench

...Modulyo caters for a range of requirements found in ...atories and industrial plants. Although intended ...arily for freeze drying the *Modulyo* is equally suited to ...vacuum duties such as evaporation and distillation. The ...consists of a functional cabinet containing air-cooled ...erator compressor, condenser chamber and control ...The condenser chamber made from corrosion ...stainless steel is thermally insulated and acts as a ... water or other solvent vapour; the large flange ...g allows easy inspection, cleaning and water ...ing. The valved drain at the front of the unit facilitating ... simple removal of condensate. An vacuum pipeline ...ects the chamber to a 16mm o.d. tube on the front panel, ...ich the E2M5 is connected. A thermocouple meter is ...to indicate condenser temperature during operation.

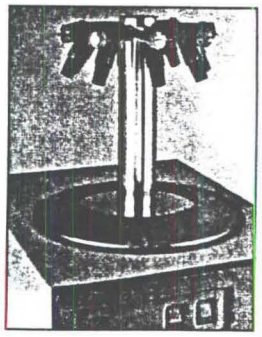
...unit designed to fit on the average bench is supplied ...plete with an *Edwards* RV5 pump, EMF10 filter and ...nection kit. For operation on 220-240V 50Hz.

...ications

...ressor, hp	⅓
...rator	
...traction rate, kcal h^{-1} at −35°C	180 (at 20°C ambient)
...ser	
...acity, total, kg,	5.0
...mp. under vacuum, °C	−55
..., litres	7.2
...dimensions, h×d×w, mm	330×470×640
...kg	45

...402/1050/00

£4387.76N



8 Flask drying accessory EDWARDS

This eight port manifold, suitable for use with the *Modulyo* is ideal for applications requiring external flask drying. Constructed from stainless steel with eight welded ports each with single neoprene valve. Supplied with 8 neoprene cones, permitting connection to the ports of 8 × 1 litre round bottom or flat bottom flasks (flask supplied separately). Dimensions h×o.d. 336×215mm, port diameter 19mm.

Cat. No. 402/1050/02

Each **£801.80N**

Flasks, round bottom, *Quickfit,* borosilicate glass, short neck, 1 litre. Pack of 2.

Cat. No. 244/0900/79

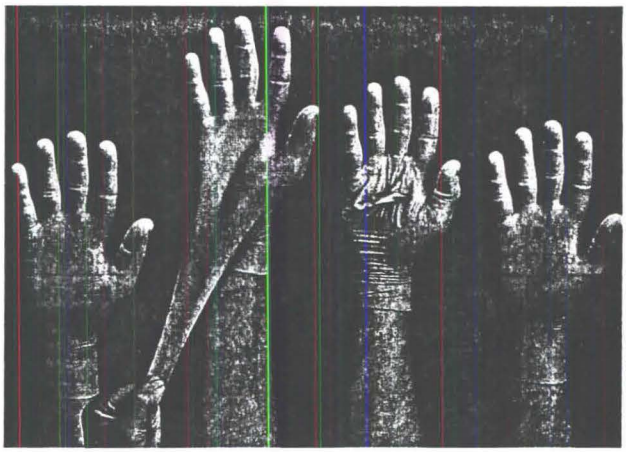
Pack **£22.63D**

Flasks, flat bottom, *Quickfit,* borosilicate glass, short neck, 1 litre. Pack of 2.

Cat. No. 244/1000/72

Pack **£23.52D**

DISPOSABLE HAND PROTECTION



- *Soft nitrile disposable gloves*
- *High sensitivity, puncture and chemical resistance better than rubber latex or vinyl*

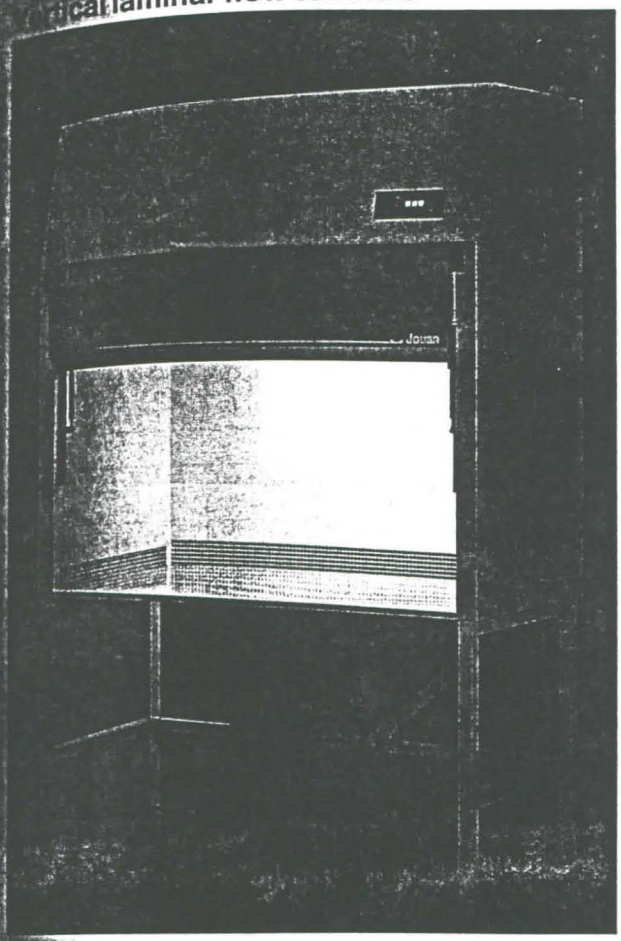
N-DEX gloves, Cat. No. 222/0606/02

Section	Page
SAFETY	**4 - 991**

JOUAN LAMINAR FLOW CABINETS

Vertical laminar flow cabinets

Jouan



Brighter

The cool, powerful lamps (1,000 lux) with an output close to daylight supply glare-free light. This is diffused by the 3 white chamber walls eliminating harsh reflections.

Quieter

The oversized blower permits automatic compensation for a gradually blocking filter. As a result the noise level remains well below the required standards, right up to the time when a filter change is needed.

General Specification

HEPA Filter	>99.999% for particles >0.3μm
Particle Count	< allowed by BS5295 Class I
Blower	High efficiency centrifugal type with auto speed compensation.
Light intensity	>1,000 lux
Noise level	<55 dBA
Work table	Fine 18/8 stainless steel
Finish	Cold rolled sheet steel 1.5mm Epoxy coated inside & outside

Specifications & Ordering Information

Model	L9	L12
Internal dim's (w×d×h), mm	965×630×760	1270×630×760
External dim's (w×d×h), mm	1085×630 ×1385	1390×630 ×1385
Weight	105kg	135kg
Cat. No. 210/0910	**/02**	**/04**
Each	£4775.38N	£5044.62N

Options & Accessories

Description	Cat. No.	Each
Plumbing for gas CO_2	**310/0710/20**	**£148.00N**
Vacuum valve	**310/0710/22**	**£148.00N**
Power socket	**310/0710/24**	**£118.00N**
Support stand	**310/0710/26**	**£369.00N**
Front enclosure	**310/0710/28**	**£306.00N**
UV Front enclosure	**310/0710/30**	**£443.00N**
Nylon coated benchtop	**310/0710/32**	**£233.00N**
Auto light & blower	**310/0710/34**	**£492.00N**
Adjustable foot rest	**310/0710/36**	**£105.00N**

COMPLETE PRODUCT PROTECTION

More Security

The L Series vertical laminar flow cabinets, built to BS5295 Class I, offer virtually total protection to biological and other products. This is ensured by the constant and automatically maintained air flow and by the 60% frontal outflow.

90% of the airflow is recycled which prolongs filter life and minimises the quantity of air blown towards the user while achieving the required level of product security.

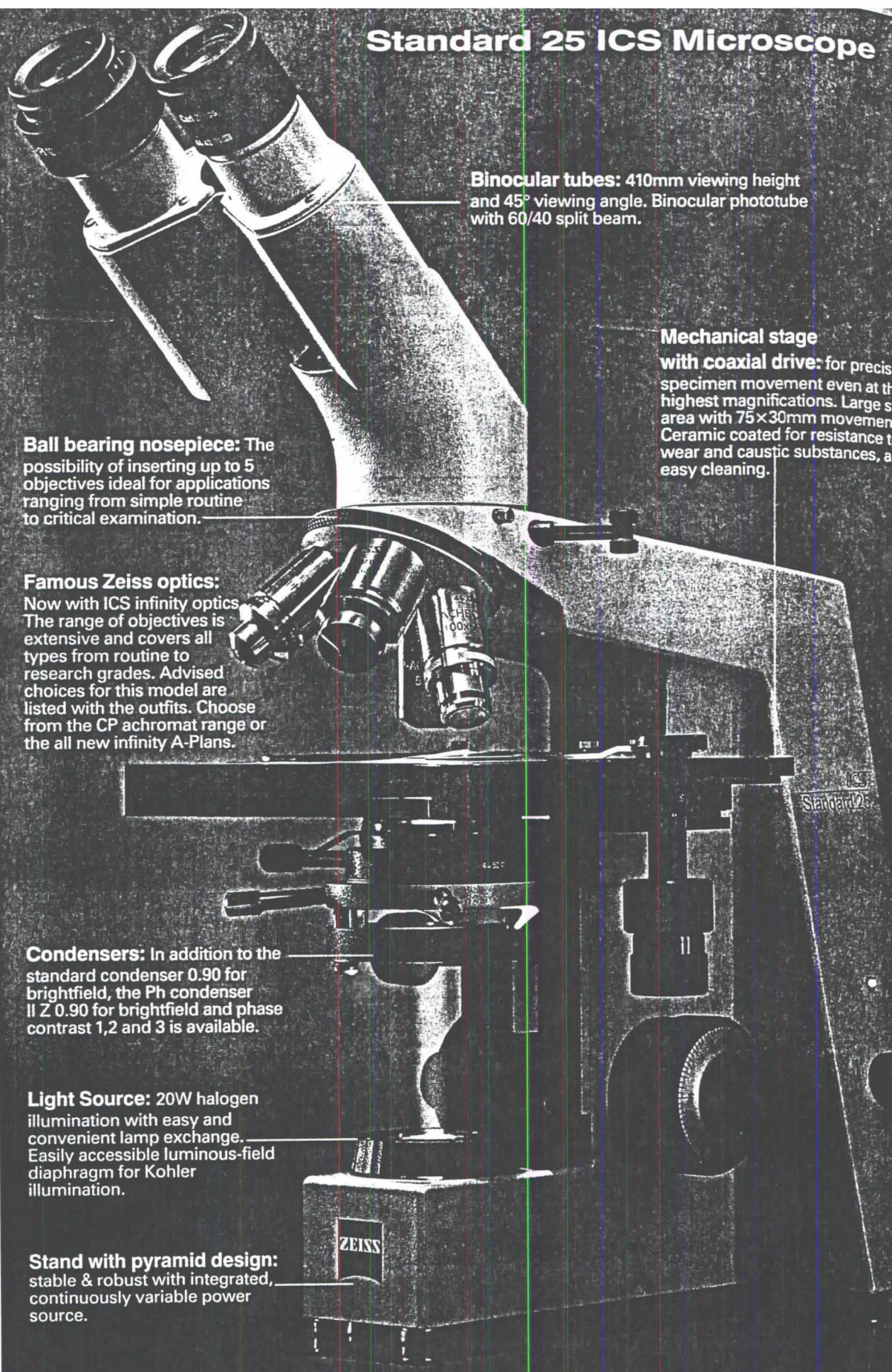
Complete

L series cabinets have the following features as standard:

- Automatic speed compensation
- Airflow indicator
- Elapsed hour counter
- D.O.P. test outlet

The price of the *Jouan* laminar flow cabinets includes delivery from Jouan Ltd. to the customers goods in area. If you require siting and installation at the point of use, please contact Jouan Ltd. on 0115 9447989.

Standard 25 ICS Microscope



Binocular tubes: 410mm viewing height and 45° viewing angle. Binocular phototube with 60/40 split beam.

Mechanical stage with coaxial drive: for precis specimen movement even at th highest magnifications. Large s area with 75×30mm movemen Ceramic coated for resistance t wear and caustic substances, a easy cleaning.

Ball bearing nosepiece: The possibility of inserting up to 5 objectives ideal for applications ranging from simple routine to critical examination.

Famous Zeiss optics: Now with ICS infinity optics The range of objectives is extensive and covers all types from routine to research grades. Advised choices for this model are listed with the outfits. Choose from the CP achromat range or the all new infinity A-Plans.

Condensers: In addition to the standard condenser 0.90 for brightfield, the Ph condenser II Z 0.90 for brightfield and phase contrast 1,2 and 3 is available.

Light Source: 20W halogen illumination with easy and convenient lamp exchange. Easily accessible luminous-field diaphragm for Kohler illumination.

Stand with pyramid design: stable & robust with integrated, continuously variable power source.

Compact ...easy to operate, and at an attractive price!

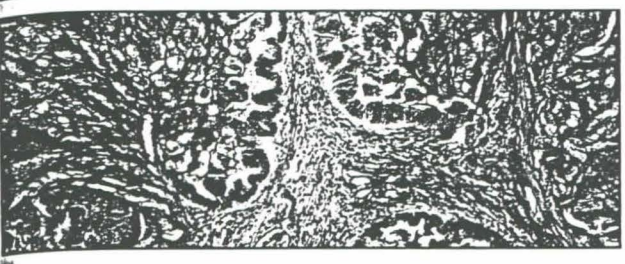
Zeiss Standard 25 ICS Microscope Systems

Standard 25 microscope stand with binocular tube, right hand mechanical stage, 18mm FOV eyepieces, dust cover, conversion filter and lamp.

Objectives must be ordered separately, see below.

Cat. No. 316/1201/00

Each £1210.00N



Standard 25 microscope stand with trinocular tube for video or photography, right hand mechanical stage, 20mm FOV eyepieces, dust cover, conversion filter and lamp.

Objectives must be ordered separately, see below.

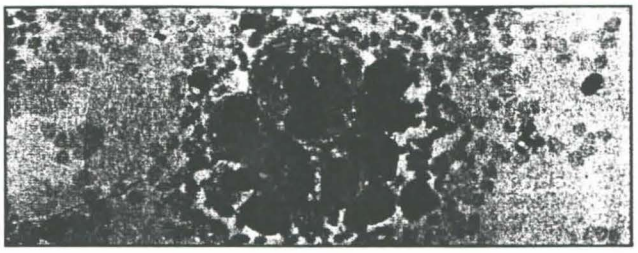
Cat. No. 316/1201/02

Each £2186.00N

CP Achromat objectives, 5×, 10×, 40× and 100× oil, brightfield condenser and immersion oil.

Cat. No. 316/1201/14

Each £630.00N



A-Plan ICS objectives, 5×, 10×, 40× and 100× oil, brightfield condenser and immersion oil.

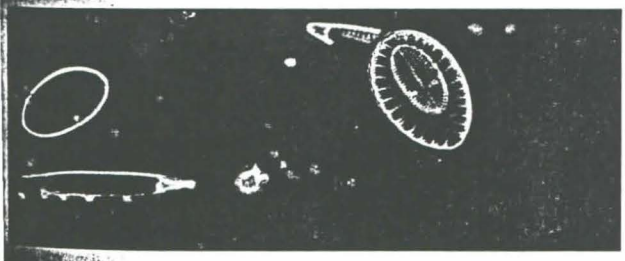
Cat. No. 316/1201/16

Each £1197.01N

Simple phase contrast outfit with CP Achromat objectives 10× brightfield, 40× Ph2 and 100× brightfield oil. Includes phase stop, pinhole diaphragm, interference green filter and immersion oil.

Cat. No. 316/1201/18

Each £828.00N



Simple phase contrast outfit with A-plan objectives, 10× brightfield, 20× Ph2 and 40× Ph2, phase stop, phase telescope and interference filter

Cat. No. 316/1201/20

Each £1041.00N

Phase contrast outfit with turret condenser and CP Achromat objectives, 10× Ph1, 40× Ph2 and 100× oil Ph3. Complete with phase telescope, interference green filter and immersion oil.

Cat. No. 316/1201/22

£1803.00N

Phase contrast outfit with turret condenser and A-plan objectives, 10× Ph1, 40× Ph2 and 100× oil Ph3. Complete with phase condenser, phase telescope, interference green filter and immersion oil.

Cat. No. 316/1201/24

Each £2094.00N

Darkfield outfit with Ultra condenser, Achroplan 100× oil iris and immersion oil.

Cat. No. 316/1201/26

£1810.00N

Polarising outfit. Polarising disc and analyser/lambda plate.

Cat. No. 316/1201/28

Each £133.00N

Carrying case for Standard 25 microscope, made to order.

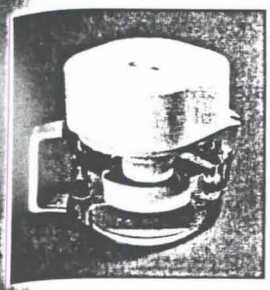
Cat. No. 316/1201/30

£181.60N

Spare lamps, 6V, 20W halogen for Standard 25 microscope only. Pack of 3.

Cat. No. 316/1201/32

Pack £39.00N



Water filter, jug

- *Filters out inorganic and organic contaminants*
- *Improves taste, provides better sample water and virtually eliminates scum and chalking*
- *Ideal for drinking, plant watering, photography, food preparation*

Mains tap water is poured into the top reservoir. It gravity feeds through a replaceable cartridge into the 2 litre pouring jug, ready for use. The filter uses activated carbon and ion-exchange resins and significantly reduces/removes chlorine, nitrates, lead, aluminium, mercury, arsenic and cadmium salts. Filter efficiency will deteriorate slightly during its life, which is about 90 litres depending upon hardness and impurity level of mains supply. There is a replacement indictor for the filter cartridge. Supplied complete with one filter cartridge Cat. No. 332/0830/10.

Cat. No. 332/0830/02

Each £21.95N

Filter cartridge, replacement, for use with jug filter Cat. No. 332/0830/02.

Cat. No. 332/0830/10

Each £4.50N

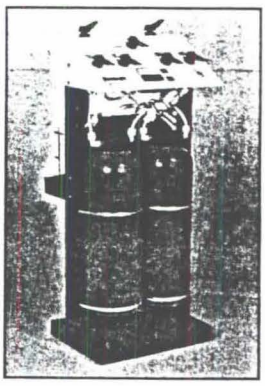
Water filter, tap fitting

- *Easily installed and removed – no special fittings needed*

Operating on the same principle as the water jug Cat. No. 332/0830/02, this completely portable unit is simply pushed onto the mains tap outlet (range of adapters provided), allowing a continuous flow of treated water to be dispensed. The unit, which can simply be moved from one location to another, has an effective life of approximately 2400 litres, depending upon input water quality. When exhausted the filter is discarded.

Cat. No. 332/0840/00

Each £12.88J



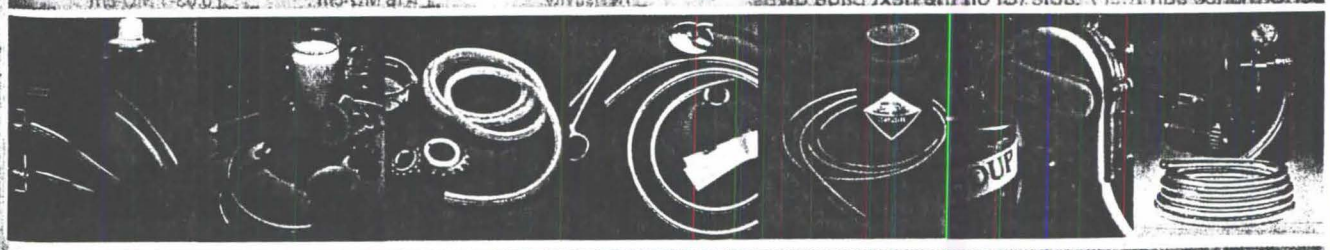
Deionisers, two stage, 24R

- *Low cost deionised water*
- *Assured water quality with integral conductivity meter*
- *Easy regeneration by the operator*
- *Robust construction for long life*

The 24R is a two stage deioniser which will produce a typical treated water quality of 15-30µs/cm at flow rates of up to 400 litres/hour. The unit has been specifically designed to give low running costs and ease of operation. Manually operated, robust in construction and simple to use. The integral conductivity meter (powered by a 9 volt PP3 battery, included), monitors water quality and indicates when regeneration is required. Regeneration is easily carried out by flushing hydrochloric acid through the cation exchange resin, and sodium hydroxide through the anion exchange resin. Typical application areas include:- laboratories, chemical dilution, PCB electronics and semiconductors, component working and milling, toiletries and cosmetics.

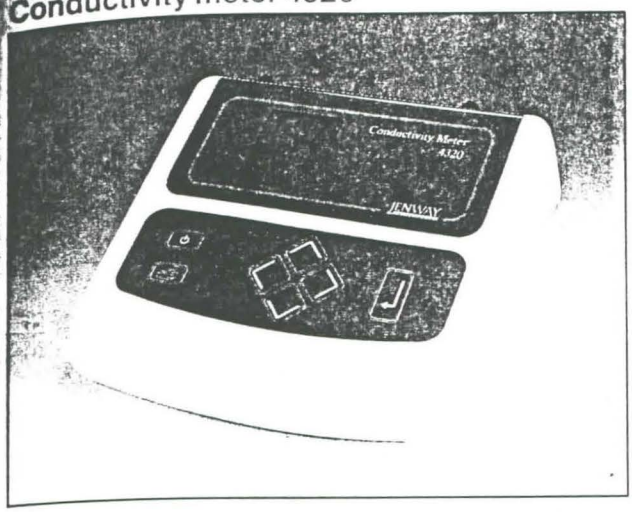
Model	24R
Max. treatment flow	400l/h
Min. treatment flow	60l/h
Max. working temp	35°C
Min. working temp	15°C
Max. working pressure	7 bar
Min. working pressure	1.5 bar
Regeneration	
100% pearl/flake caustic soda (Sodium Hydroxide)	1.2kg
30% w/w caustic soda (Sodium Hydroxide, preferred)	2.7l
46% w/w caustic soda (Sodium Hydroxide)	1.75l
32% w/w hydrochloric acid	3.5l
Effluent volume per regen.	400l
Max. flow per regeneration	700l/h
Regeneration time	90 min
Dimensions, overall	430×1050×360
Mass, overall working	45kg
Cat. No. 332/0930/04	
Each	**£2391.49N**

CHEMICALS–FOOD–MEDICINE–TYGON® – laboratory and industrial tubing



Section TUBING Page 4-1194

Conductivity meter 4320

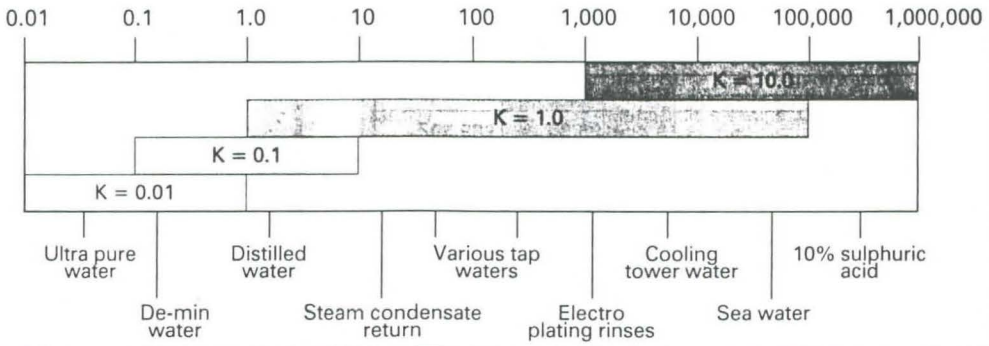


- *Values can be displayed in Siemens, Mohms, TDS and Salinity (ppm NaCl)*
- *Bi-directional RS232 interface*
- *Sealed push button control panel*
- *Quick and easy to calibrate*

The model 4320 is a user friendly research conductivity meter including the features of the 4310 but with a LCD graphic display. This prompts the user with plain language instructions and structured menu's which allows easy access to features with single key strokes. Conductivity values can be displayed in Siemens or, if you are measuring low conductivities such as purified water, Mohm. The reading can also be shown in Total Dissolved Solids which relate conductivity to the concentration of NaCl. A salinity mode can also be selected which will display conductivity results in ppm of NaCl. The meter can be calibrated at 1, 2 or 3 points on standard solutions, see Cat. No. 309/0741/16 on page 4 - 1236 or by reference to the cell constant. A calibrated reminder with an interval of 1 to 999 hours from last calibration can be set and the meter can be programmed to give a timed printout from 1 second to 1 day by using printer Cat. No. 309/0116/50. Supplied complete with a glass K=1 cell with built in ATC, Cat. No. 309/0126/30, Swing arm electrode holder and power supply.

Model	4320
Conductivity Ranges:	0 to 1.999S 0 to 19.99S with X10 Cell 0 to 1999g/l 0 to 20Mohms
Resolution:	0.001µS to 0.01S 0.001mg/l to 1g/l 0.01Mohms
Accuracy:	±0.5% ±2 digits ±2% ±2 digits on Mohm range
Temperature Ranges:	-10 to 105°C +14 to +220°F
Resolution:	0.1°C/1°F
Accuracy:	±0.5°C/±1°F
ATC Range:	0 to 100°C +32 to +212°F
Salinity Range: Resolution: Accuracy:	0 to 99.9 0.1 0 to 35 ±1 35 to 99.9±3
Calibration:	1, 2 or 3 point calibration on standard solutions or via cell constant adjustment.
Outputs:	Bi-directional RS232C Analog output with adjustable resolution. Hi/Lo Alarm outputs open collector. 0.5A 50Vdc max. Electrode platinizing socket applying 10Vac 0.05Hz
Alarm points:	0-19.99S, 0-1999g/l
GLP: Size: (l×w×d)	Calibration reminder with an interval of 1 to 999 hours last calibration Timed printout with an interval from 1 second to 1 day. 275×240×150, mm
Weight	1.2kg
Cat. No. Each	**309/0712/06** **£715.00**V

RECOMMENDED OPERATING RANGES FOR CONDUCTIVITY CELLS

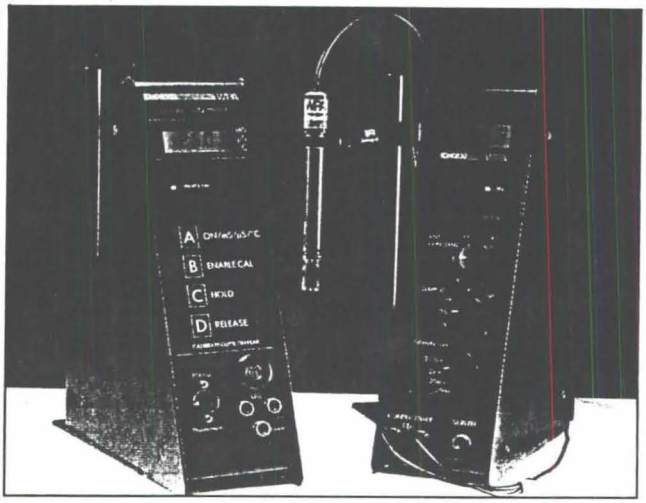


Approximate conductivity of various solutions at 25°C in microsiemens/cm

Ultra pure water
De-min water
Distilled water
Steam condensate return
Various tap waters
Electro plating rinses
Cooling tower water
Sea water
10% sulphuric acid

Conductivity meters, CMD830 and CMD8500

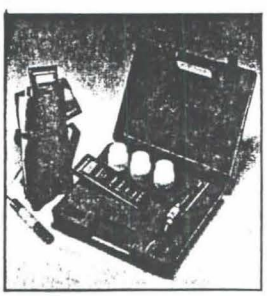
WPA



- *Rugged metal case*
- *Vertical format - small footprint*

The CMD830 is a simple bench instrument designed for routine Q/C applications. Operation is straight forward. Housed in a rugged metal case, it offers good protection against harsh environments.
The CMD8500 is a highly specified microprocessor controlled bench instrument, designed for both research and industrial applications. Both temperature coefficient and cell constant may be varied over a wide range. RS232 output permits connection to a PC. The instrument is supplied with a temperature probe but **no cell.**

Model	CMD830	CMD8500
Display Ranges	0-199.9mS 0-19.99mS 0-1999µS 0-199.9µS	0-199.9mS 0-19.99mS 0-1999µS 0-199.9µS
Temperature Compensation	0-50°C manual	0-70°C Auto & Manual
Cell constant	0.9-1.1	0.05-19.99
Temperature Coefficient	2%/°C	0 to 5.00 (x0.01)%/°C
Accuracy	<1%	<0.5%
Output	-	RS232
Dimensions/Weight	80×210×280mm, 2kg	80×210×280mm, 2kg
Power	110-240V, 50-60Hz, AC	110-240V, 50-60Hz AC
Cat. No.	**309/8300/00**	**309/8500/00**
Each	**£349.00N**	**£450.00N**



Conductivity cell, plastic, for use with meters 309/8000/00, 309/8000/02, 309/8300/00 and 309/8500/00, K=1=10%.

Cat. No. 309/8000/06
Each **£57.00N**

Conductivity cells, glass calibrated for use with meters 309/8000/00, 309/8000/02, 309/8300/00 and 309/8500/00 K=1.0.

Cat. No. 309/8000/08
Each **£69.00N**

Conductivity cells, epoxy bodied, for use with meters 309/8000/00, 309/8000/02, 309/8300/00 and 309/8500/00.

	Cat. No.	Each
K=0.1±2%	**309/8000/10**	**£143.28N**
K=1±2%	**309/8000/12**	**£143.28N**
K=10±1%	**309/8000/14**	**£231.93N**

ABS carrying case for meters 309/8000/00 and 309/8000/0

Cat. No. 309/8000/16
Each **£50.00N**

Soft vinyl carrying case for meters 309/8000/00 and 309/8000/02

Cat. No. 309/8000/18
Each **£15.00N**

Conical flasks
see FLASKS, from page 4 - 498

Connectors
see TUBING, pages 4 - 1205 and 4 - 1206

Containers – see:

BOTTLES, from page 4 - 106
JARS, from page 4 - 606
PACKAGING, from page 4 - 757
SAMPLE COLLECTION, from page 4 - 1019

Coplin jars
see HISTOLOGY, page 4 - 562

Copper and lead analyser
see ENVIRONMENTAL ANALYSIS, page 4 - 426

Copper electrode
see pH METER ELECTRODES, page 4 - 797

Cord, PTFE, multi-use
see BENCH PROTECTION, page 4 - 98

Corks
see STOPPERS, page 4 - 1099

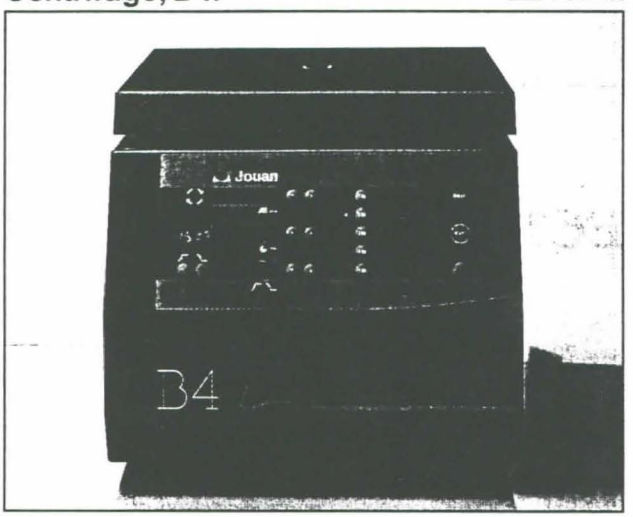
Cork rings,
see BENCH PROTECTION, page 4 - 95

Correction fluid, Tipp-Ex®
see OFFICE SUPPLIES, page 4 - 739

Cotton wool
see CLEANING, page 4 - 324.

Centrifuge, B4i

Jouan



- *Multiple rotor systems available*
- *Rapid rotor exchange via AUTO-LOCK*
- *Maintenance free induction drive*
- *Sealed accessories for Biological Safety*
- *5 personalised memories*
- *Only 58dB at 3,000 rpm*

Whatever type of sample you have to prepare, using blood tubes, biological analysis, cytology slides, cell culture, etc., the B4i multi-use centrifuges will simplify your work.

Save time in frequently used routines with the direct recall programmes. Press just one key and you're ready to start. Short acceleration and braking times (with 5 variable rates), a PULSE KEY for short runs and elevated performance (18,000g on microtubes).

Biological Safety
An end to biological risks when handling your samples. For your personal safety, centrifuge the tubes, bottles and microplates in total security, with accessories successfully tested by C.A.M.R. Porton Down in accordance to IEC 1010-2-020.

Specification

Top speed (swing-out)	4,000 rpm
Maximum force	2,880×g
Maximum capacity	4×200ml
Temp. range	Ambient
Dimensions (h×w×d)	372×400×492mm
Weight	40 Kg

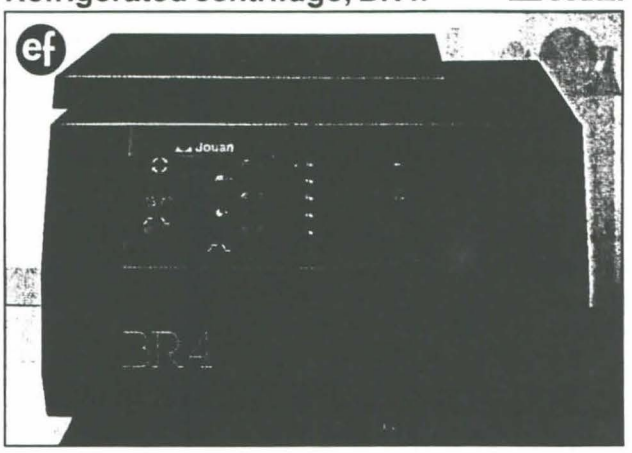
Cat. No. 220/0102/02

Each **£1615.00**N

Please Note, the B4i is supplied without rotors. Please see next page.

Refrigerated centrifuge, BR4i

Jouan



- *Pre-cool facility*
- *4°C at maximum speed*
- *CFC free refrigerant*
- *Maintenance free induction drive*

Sample protection

The refrigeration system is designed for intensive use, even in a warm laboratory. A pre-cool facility is available in addition to 5 acceleration and braking rates for sensitive samples.

AUTO-LOCK
In less than 5 seconds you can install any one of the eight rotors, thanks to the patented AUTO-LOCK system. This allows the B4i series to combine the function of several units for the price of one.

Specification

Top speed (swing-out)	4,100 rpm
Maximum force	3,026×g
Maximum capacity	4×200ml
Temp. range	-9°C to +40°C
Dimensions (h×w×d)	375×575×605mm
Weight	72kg

Cat. No. 220/0102/05

Each **£2880.00**N

Please Note, the BR4i is supplied without rotors. Please see next page.

SpinPacks centrifuge systems

Jouan NEW

Microtube SpinPack
A *Jouan* B4i centrifuge complete with 24×1.5ml sealed angle rotor.

Cat. No. 220/0102/03

Each **£1858.50**N

General purpose SpinPack
Comprising a *Jouan* B4i centrifuge complete with a swing-out rotor, four buckets with sealing caps; 2 inserts for 3×15ml tubes each and 2 inserts for 1×50ml conical tubes each.

Cat. No. 220/0102/04

Each **£2331.70**N

COLDSpinPacks centrifuge systems

Jouan NEW

Microtube COLDSpinPack
A *Jouan* BR4i centrifuge complete with 24×1.5ml sealed angle rotor.

Cat. No. 220/0102/06

Each **£2843.75**N

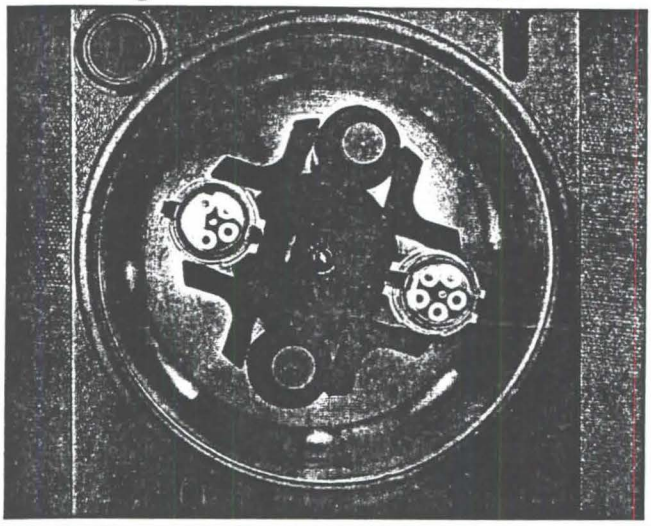
General purpose COLDSpinPack
Comprising a *Jouan* BR4i centrifuge complete with a swing-out rotor, four buckets with sealing caps; 2 inserts for 3×15ml tubes each and 2 inserts for 1×50ml conical tubes each.

Cat. No. 220/0102/07

Each **£3506.50**N

B4i swing-out rotors & accessories

Jouan

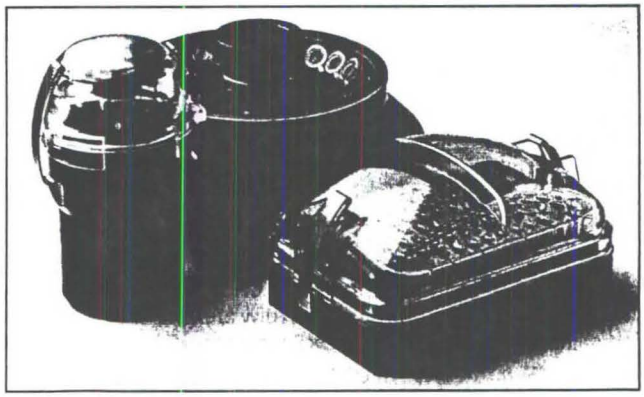


Guide to swing out accessories
The B4i series centrifuges require an appropriate rotor for operation.
Note: Buckets and inserts will be required for the swing-out rotor option unless otherwise stated.

Description	Capacity	Total no. tubes	Dimensions	RPM	RCF (x g)	Pack qty	Cat. No.	Pack
S40 Swing-out Rotor	4×200ml		Ø57mm	4,100	3,026	1	**220/0102/10**	£328.00N
Standard Buckets	200ml		Ø57mm	4,100	3,026	4	**220/0102/12**	£225.00N
**Sealing Caps						4	**220/0102/14**	£154.00N
PP bottle with cap			56.5×112mm	4,100	3,026	6	**220/0102/16**	£179.00N
Inserts	6×1.5ml-2ml	24	11×39mm	4,100	3,026	4	**220/0102/18**	£78.00N
Inserts	12×3-5ml	48	Ø12mm	4,100	3,026	4	**220/0102/19**	£78.00N
Inserts	12×5ml open	48	Ø12.5mm	4,100	3,026	4	**220/0102/20**	£256.00N
Inserts	6×5-6ml	24	Ø13.5mm	4,100	3,026	4	**220/0102/21**	£78.00N
Inserts	5×5-7ml	20	Ø13.5mm	4,100	3,026	4	**220/0102/22**	£78.00N
Inserts	5×Z5,5ml	20	17×60mm	4,100	3,026	4	**220/0102/23**	£186.00N
Inserts	5×Z10,10ml	20	Ø17×60/105mm	4,100	3,026	4	**220/0102/24**	£369.00N
Inserts	5×10ml	20	Ø16mm	4,100	3,026	4	**220/0102/25**	£78.00N
Inserts	3×12ml	12	Ø17.5mm	4,100	3,026	4	**220/0102/26**	£369.00N
Inserts	7×15ml	18	Ø17mm	4,100	3,026	4	**220/0102/27**	£78.00N
Inserts	3×15ml conical	12	17×122mm	4,100	3,026	4	**220/0102/28**	£156.00N
Inserts	3×20ml	12	Ø22mm	4,100	3,026	4	**220/0102/29**	£78.00N
Inserts Universal	1×25ml Plastic	4	25×85mm	4,100	3,026	4	**220/0102/30**	£266.00N
Inserts Universal	1×25ml Glass	4	29×85mm	4,100	3,026	4	**220/0102/31**	£186.00N
Inserts	1×50ml conical	4	30×116mm	4,100	3,026	4	**220/0102/32**	£256.00N
Inserts	1×50ml	4	Ø33mm	4,100	3,026	4	**220/0102/33**	£78.00N
Inserts	1×100ml	4	Ø45mm	4,100	3,026	4	**220/0102/34**	£78.00N
Cytobuckets	3×Cyto-samples	6		4,100	2,218	2	**220/0102/40**	£433.00N
S20 Swing-out Rotor including carriers	6×Microplates 2×96 well blocks			3,000	1,157	1	**220/0102/45**	£488.00N
**Sealed carriers	2×2 microplates			3,000	1,157	2	**220/0102/47**	£270.00N
Cushion for microplate	1× microplate					1	**220/0102/49**	£35.00N

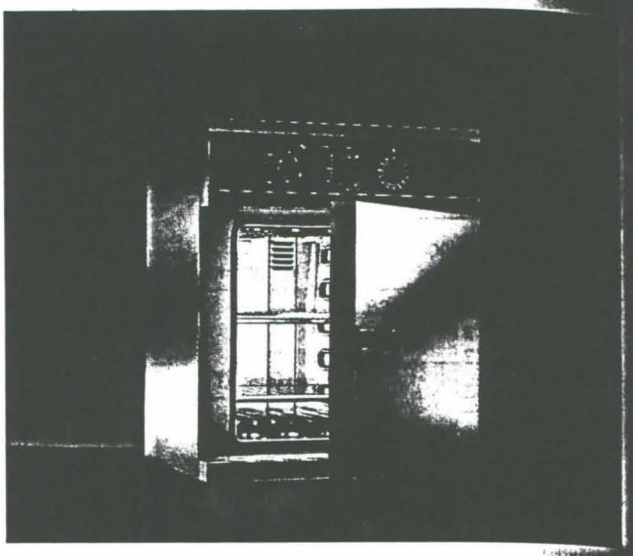
Biological Safety
Look out for the ** marking which indicates that the centrifuge accessory has been successfully tested for biological containment by CAMR, Porton Down.

Rotors continued on next page



SM sterilizers

- *Unique rib heating system provides excellent uniformity of temperature in chamber*
- *All stainless steel construction - easy to clean and corrosion resistant*
- *Temperature range 30 to 220°C*
- *Fitted with 0 to 24 hour timer for automatic process operation*
- *LED digital display shows actual working temperature*



Memmert SM sterilizers are ideal for hot air processing of glassware, media, instruments, etc, and the rapid heating cycle with timer ensures reliable and swift sterilization. The radiant rib construction of the chamber, with all-round heaters and full insulation, provides excellent temperature performance, variation being below ±4.5°C.

Heaters are fully encased, protecting them against any moisture. Control is by means of a mechanical thermostat (fluctuation ±1.1°C) with overtemperature protection to DIN 12880 standards. All models are supplied with two stainless steel shelves, and the mains cable is fitted with a UK 13A plug. For operation on 220/240V, ac single phase, 50Hz supply.

Specifications and ordering information

Memmert Model No. (SM)	**100**	**200**	**300**	**400**
Capacity, litres	14	32	39	53
Dimensions (w×d×h), mm				
Internal	320×175×240	400×250×320	480×250×320	400×330×400
External	470×325×520	550×400×600	630×400×600	550×480×680
Number of shelf supports fitted	2	3	3	4
Max load per shelf, kg	10	15	15	12
Power rating, W	600	1100	1200	1400
Mass, kg	21	29	32	35
Cat. No. 322/0195	**/01**	**/02**	**/03**	**/04**
Each	**£539.61V**	**£595.97V**	**£650.24V**	**£703.47V**

LTE CUSTOMISED THERMAL PRODUCTS

- Quality products tailor-made to your specification
- Technical consultation and design by LTE specialists
- Drawing packages for approval
- Installation and testing facilities

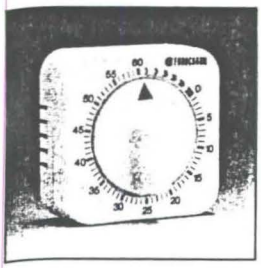
If you feel that your needs cannot be met by a modified standard product then our customer designed service can help. We will liaise with you and LTE's Technical Department to produce a specification for a suitable custom built product.

Included within the Customised Thermal Products are Walk-in Rooms, Production Dry Heat Sterilizers and Flameproof Ovens. The specifications for these products are well defined, control systems are often standard, but the size is usually variable.

For general enquiries regarding the Customised Thermal Products service, please contact our Customer Service Centre on 0800 22-33-44 (Fax 01455 558586).

Stevenson screen
see METEOROLOGY, page 4 - 636

Stills, water
see WATER PURIFICATION, from page 4 - 1218

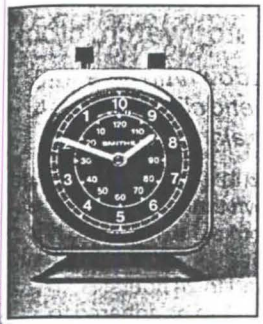


Timer, countdown

For timing periods from 1 to 60 minutes. Setting the interval winds the mechanism. Alarm sounds when timing period has elapsed. Dimensions 60×60×35mm.

Cat. No. 264/0039/00

Each £9.12J

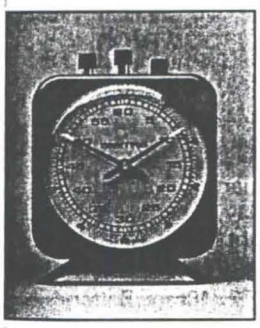


Timer, countdown

Time is set by centre knob up to a maximum of two hours. Timing period over when alarm sounds. Start button is green, stop is red, 90mm diameter dial, black with luminous spots. Silver-finish metal case with black base. Overall size; 127×103×68mm, mass 380g.

Cat. No. 264/0045/00

Each £33.69J



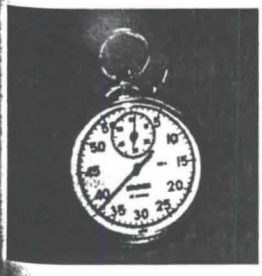
Timer, interval, key wind

- *Big, 90mm diameter dial*
- *Separate minute and second hands*
- *Individual buttons for stop start and zero*

Graduated 0 to 60 with two large sweep hands, one for minutes and one for seconds. Start button is green, stop is red, zero button is black. Silver finish 90mm dial with black metal case and base. Overall size, 128×103×58mm; mass 320g.

Cat. No. 264/0050/00

Each £32.73J



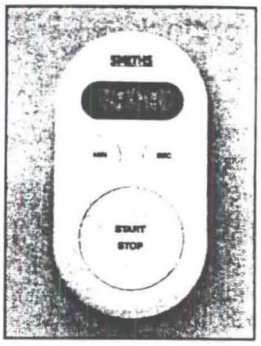
Timer, stopwatch

- *Jewelled lever movement*
- *Push button operation*

Records up to 60 minutes, giving a reading in minutes, seconds and fifths of a second. 16 jewelled lever movement with side hand re-set button. Encased in a chromed metal body, diameter 53mm.

Cat. No. 264/0023/02

Each £40.90J

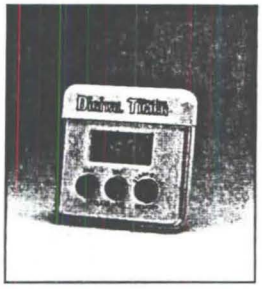


Timer, countdown

This timer has a maximum setting of 99 minutes and 59 seconds, and counts down in 1 second increments. At 0.00 a beeping alarm sounds for 30 seconds or until the timer is turned off. The countdown is stored for repeat timings. Incorporates a magnetic attachment on the back. Battery included.

Cat. No. 264/0037/02

Each £10.42J



Timer, countdown to 100 minutes

A simple inexpensive countdown only timer with single memory and zero time alarm. Clear 10mm LCD with 3 button control for setting minutes and seconds, start/stop, clear and memory. Magnetic back clip and stand. Supplied with 1.5V AAA battery, fitted.

Cat. No. 264/0044/02

Each £7.89J

Timer, countdown/ count up, clock

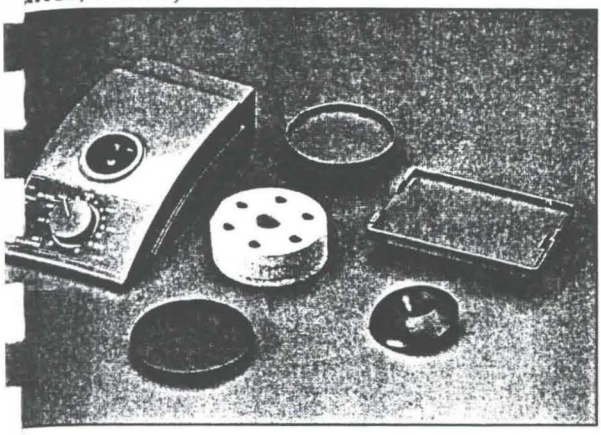
- *Easy numeric setting*
- *Last setting memory*
- *AM/PM selection*

Clock with single timer and count-up functions to 9hr 59min. Times can be quickly and easily set by direct numeric input rather than having to use multi-function buttons. Unit can be hand held, stood on the desktop or adhered to a metal surface using the built-in magnet. Supplied complete with battery.

Cat. No. 264/0037/04

Each £14.86J

aker/mixer, Mini MS1 IKA

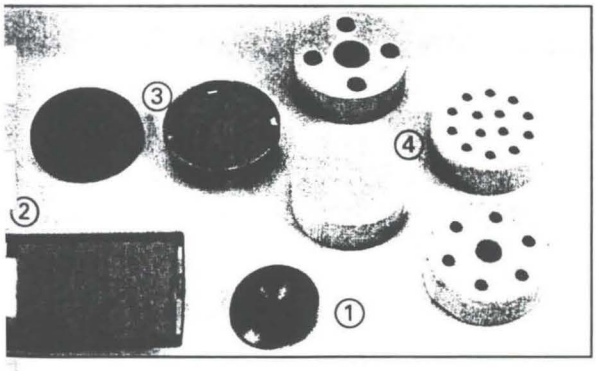


Auto start and stop for true one handed operation
Continuous or intermitent operation
Unique soft rubber cup for tubes up to 30mm dia.
Three alternative shaking heads included

Robust variable speed model with speed electronically controlled and adjustable from 20 to 2200rpm. Orbital movement of 4.5mm and a special setting for microtitre plates. Supplied complete with microtitre platform, soft rubber platform for flasks or beakers up to 250ml and universal platform. Overall dimensions (w×d×h) 240×240×60mm, weight 3.5kg. For operation on 230V, 50/60Hz.

Cat. No. 330/0378/02
£234.60N

essories and spares for MS1 shaker IKA



ndard attachment, (1) supporting plate for tubes, imum diameter 30mm.

No. 333/0378/00
£5.00N

e hand attachment, (3) supporting plate for beakers and ks.

No. 333/0378/02
£9.22N

t tube attachments, (4)

es	Cat. No.	Each
×18mm	333/0378/04	£17.23N
10mm	333/0378/06	£17.23N
15mm	333/0378/08	£17.23N
holes	333/0378/10	£8.41N

Test tube attachment support

Cat. No. 333/0378/12
Each £6.39N

Microtitre plate attachment, (2) for 85×130mm plates.

Cat. No. 333/0378/14
Each £15.20N

One hand insert for use with Cat. No. 333/0378/12.

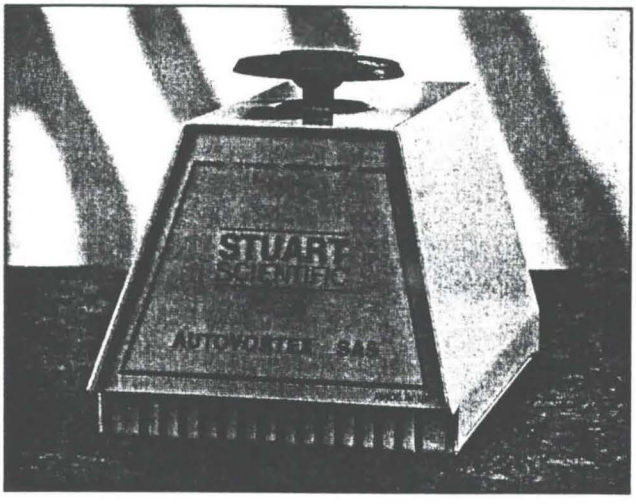
Cat. No. 333/0378/16
Each £2.94N

Shaker/mixer, Mini MS2 IKA

The MS2 is the same shaker unit as the MS1 but without the microtitre plate option and attachments.

Cat. No. 330/0378/04
Each £209.10N

Shaker/mixer, AutoVortex STUART SCIENTIFIC



- *Automatic start and stop for one-handed operation*
- *Variable and fixed speed models*

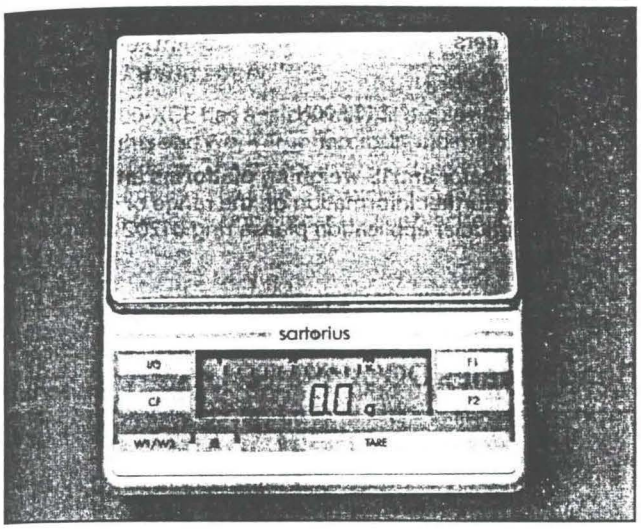
Robust, vibration-free and quiet shakers which have a unique rubber cup to allow shaking of tubes inside the cup and larger tubes, and even small bottles, on the outside. One model is fixed speed, the other has a recessed wheel for changing the speed located at the bottom of the front fascia. Both models have on/off switches at the rear to give these shakers a clean modern appearance. For operation on 220/240V, 50Hz supply.

Speed	Fixed	Variable
Dimensions, h×w×d Weight	110×110×175 1.5kg	
Cat. No. 333/0195	**/02**	**/04**
Each	£133.00N	£155.00N

SARTORIUS PORTABLE SERIES

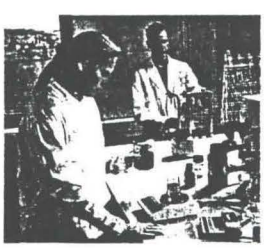
PT series square-pan

sartorius



- *Compact size*
- *Light and easy to carry*
- *Fast, stable display*
- *Battery power option*

The PT portable series balances are small, light, compact and easy to carry which means that they really live up to their name and are ideally suited to those applications where you have to weigh on the move or away from a permanent laboratory setting. In fact, if you fit the optional internal rechargeable battery pack, you can literally use the balance anywhere at a moments notice. This makes them suitable for biological field work, warehouse inventory checking and trading standards work. There are three models from a tenth of a gram to one gram readability, and 610g to 6.1kg capacities. As a natural addition to their mobile personality there is a carrying case available as an optional accessory.

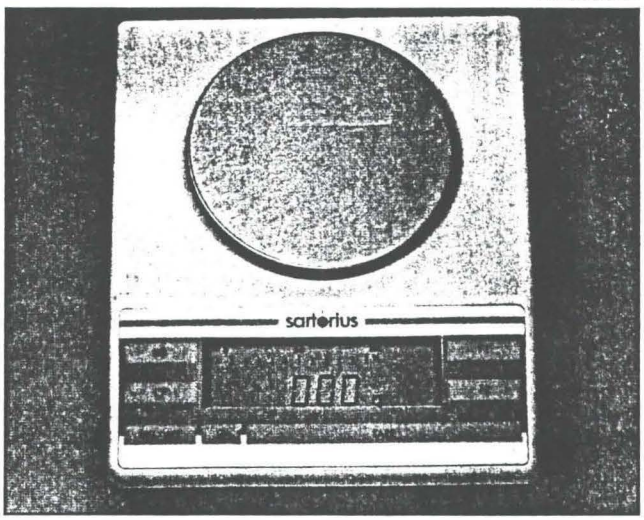


Specifications

Model	PT1500	PT3100	PT6
Capacity	1500g	3100g	6100g
Readability	0.1g	0.1g	1g
Pan size	174×133mm	174×133mm	174×133mm
Type	Single range	Single range	Single range
Cat. No. 303/4006	**/02**	**/12**	**/04**
Each	**£465.00V**	**£595.00V**	**£385.00V**

PT series round-pan

sartorius



- *Compact size*
- *Light and easy to carry*
- *Fast, stable display*
- *Battery power option*

Nearly every type of *Sartorius* balance can be quite easily transported. There is no need to lock the mechanism and on arrival at the new site connect to the mains supply and allow some time to temperature equilibrate. The PT portable series balances make it even easier to do mobile weighing. They are small, light, compact and easy to carry which means that they really live up to their name and are ideally suited to those applications where you have to weigh on the move or away from a permanent laboratory setting. In fact, if you fit the optional internal rechargeable battery pack you can literally use the balance anywhere at a moments notice. This makes them suitable for biological field work, warehouse inventory checking and trading standards work. There are four models from a hundredth of a gram to one gram readability, and 150 to 610g capacities. As a natural addition to their mobile personality there is a carrying case available as an optional accessory.

Specifications

Model	PT150	PT310	PT600
Capacity	150g	310g	600g
Readability	0.01g	0.01g	0.1g
Pan diameter	116mm	116mm	116mm
Type	Single range	Single range	Single range
Cat. No. 303/4006	**/06**	**/14**	**/08**
Each	**£445.00V**	**£495.00V**	**£385.00V**

Accessories for PT series portable balances

Carrying case, suitable for all PT models.

Cat. No. 303/4005/15	
Each	**£138.00V**

Battery pack, rechargeable, for use with any PT model.

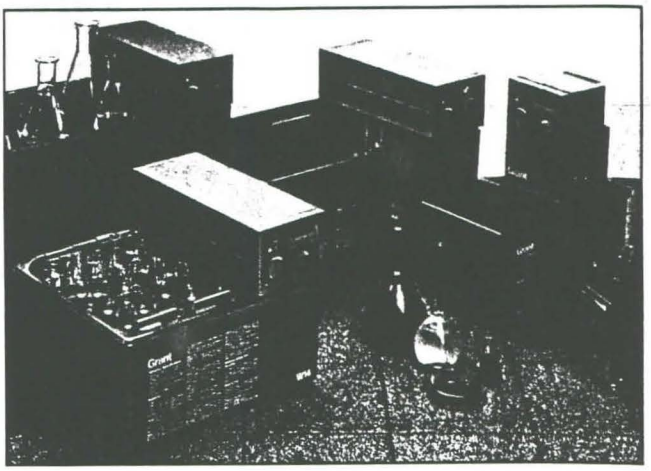
Cat. No. 303/4005/18	
Each	**£110.00V**

The PT balance will be replaced during 1998. Please call 01202 664434 for further details.

Thermostatic water bath/circulators, W Series

Grant

- *Excellent stability, ±0.004°C*
- *Wide temperature range 0° to 150°C*
- *Pump for external circulation fitted as standard*
- *Exceptional temperature uniformity throughout the bath*



The W series of precision baths form part of a comprehensive selection of thermostatic products from *Grant Instruments.* They are available in five tank sizes with a choice of digital or analogue control units. Baths are complimented by a range of useful accessories.

Designed for precision

Every bath is fitted with an electronic temperature control system, using Pt 1000 temperature sensors. The most significant feature of the control system is its unsurpassed long-term stability.

The circulation system maintains a high degree of temperature uniformity throughout the bath. A propeller forces liquid down below the control unit, under a circulation tray, and up at the far end. This produces a powerful horizontal flow throughout the whole of the working space, which is much less affected by objects in its path than conventional pump stirring.

Note: 6-litre (W6) baths are not fitted with a circulation tray because good uniformity can be maintained throughout the small working space by the impeller alone.

Baths

The five baths in the range include 38-litre, 28-litre, 22-litre and 14-litre tanks, plus a 6-litre model intended primarily as a small circulator for pumping temperature-controlled liquid round other apparatus.

Baths have stainless steel tanks with outer cases of fibre-reinforced plastic. Lifting handles are recessed into the ends of the baths. Straightforward instructions are printed clearly on the outside of the baths.

Control units

Control units have an injection-moulded case for components, with heater, pump, stirrer and temperature sensor projecting downwards into the liquid. The control unit of a 6-litre bath is mounted on a stainless steel cover over the tank, while those for larger models fit over one end of the bath.

There is a choice of two control systems, analogue or digital. The **analogue** system has a conventional knob and dial, with knob lock, and a screwdriver-operated control for fine adjustment over a band of 2°C. The **digital** system is available at very little extra cost. To set the temperature, the knob is pushed in and turned until the required temperature appears on the digital display. Once the knob is released, the set temperature cannot be accidentally altered and the display shows the actual liquid temperature. Controls on both systems are recessed, and control units can be easily detached for cleaning or servicing.

The pump allows any bath to be used for circulating temperature-controlled liquid round other apparatus.

Specifications and ordering information

Grant model No.	W6-KD	W6-KA	W14-ZD	W14-ZA	W22-ZD	W22-ZA	W28-ZD	W28-ZA	W38-ZD	W38-ZA
Temperature setting	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue
Temperature display	LCD	---	LCD	---	LCD	---	LCD	---	LCD	---
Display-resolution, °C	0.1	---	0.1	---	0.1	---	0.1	---	0.1	---
Temperature range (1), °C	0 to 150		0 to 150		0 to 150		−30 to +150	0 to 150	−30 to +150	0 to 150
Stability, °C	0.004		0.004		0.004		0.004		0.004	
Uniformity, °C	±0.01		±0.01		±0.02		±0.02		±0.01	
Tank capacity, litres	6		14		22		28		38	
Tank dimensions, l×w×d, mm	300×150×150		325×300×150		505×300×150		505×300×200		690×300×200	
Top opening, l×w	120×145		210×300		390×300		390×300		580×300	
Liquid depth, min/max, (2) mm	80/140		70/130		70/130		120/180		120/180	
Overall dimensions, l×w, mm	330×180		350×325		530×325		530×325		720×325	
height to tank rim, mm	175		175		225		225		225	
overall height, mm	365		270		320		320		320	
Pump, max head, metres	1.7		1.7		1.7		1.7		1.7	
max flow, water, l/min	8.5		8.5		8.5		8.5		8.5	
Safety protection, temperature level	adj. cutout float switch		adj. cutout float switch		adj. cutout float switch		adj. cutout float switch		adj. cutout float switch	
Heater power at 220-240V, kW	1.4		1.4		1.4		1.4		1.4	
Overall consumption at 220-240V, kW	1.5		1.5		1.5		1.5		1.5	
Cat. No. 304/2050	**/02**	**/04**	**/12**	**/14**	**/16**	**/18**	**/22**	**/24**	**/32**	**/34**
Each	£734.00V	£625.00V	£729.00V	£620.00V	£776.00V	£667.00V	£782.00V	£673.00V	£848.00V	£739.00V

Notes:

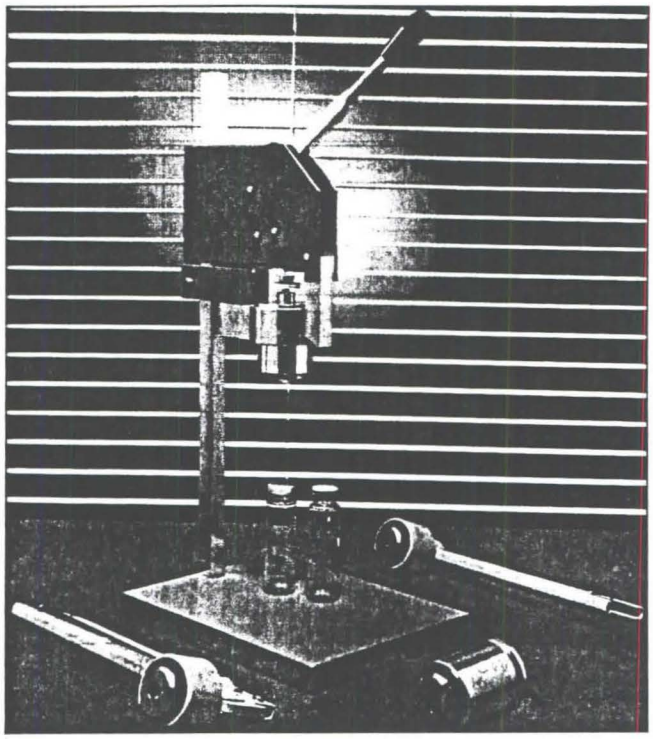
(1) With accessory cooling below room temperatures. See page 4 - 85 for cooler units.

(2) Maximum depth can be increased by 10mm by removing the circulation tray in 14, 22, 28 and 38-litre baths, with slight loss of performance.

CHROMACOL CRIMP CAPPING SYSTEMS

The Crimpmate benchtop crimper has a unique lever action which greatly reduces the effort needed to produce a perfectly crimped vial. The quality of the seal can be reproduced every time, speeding the process and avoiding muscle fatigue for the operator.

Chromacol hand crimpers are fitted with hardened steel jaws to prolong their working life. They have an adjustable stop to give reproducible crimp pressure. The 8 mm crimper features a centring device to locate the smaller vials to the correct position.



Crimpmate workstation

Jaw Size	*Chromacol No.*	Cat.No.	Each
Without jaws	CMS-0	372/5000/00	£373.00N
8 mm jaws	CMS-8	372/5000/08	£519.00N
11 mm jaws	CMS-11	372/5000/11	£519.00N
13 mm jaws	CMS-13	372/5000/13	£519.00N
20 mm jaws	CMS-20	372/5000/20	£519.00N

Crimpmate jaw set

Jaw Size	*Chromacol No.*	Cat.No.	Each
8 mm jaws	CMJ-8	372/5100/08	£156.00N
11 mm jaws	CMJ-11	372/5100/11	£148.00N
13 mm jaws	CMJ-13	372/5100/13	£148.00N
20 mm jaws	CMJ-20	372/5100/20	£148.00N

Crimpmate decapper jaws

Jaw Size	*Chromacol No.*	Cat.No.	Each
8 mm jaws	CDJ-8	372/5110/08	£158.00N
11 mm jaws	CDJ-11	372/5110/11	£162.00N
20 mm jaws	CDJ-20	372/5110/20	£193.00N

Hand crimpers

Jaw Size	*Chromacol No.*	Cat.No.	Each
8 mm jaws	CR-8	372/5200/08	£209.00N
11 mm jaws	CR-11	372/5200/11	£188.00N
13 mm jaws	CR-13	372/5200/13	£203.00N
20 mm jaws	CR-20	372/5200/20	£191.00N
30 mm jaws	CR-30	372/5200/30	£505.00N

Decappers

Jaw Size	*Chromacol No.*	Cat.No.	Each
8 mm mouth	DCR-8	372/5300/08	£42.00N
11 mm mouth	DCR-11	372/5300/11	£42.00N
13 mm mouth	DCR-13	372/5300/13	£42.00N
20 mm mouth	DCR-20	372/5300/20	£42.00N
30 mm mouth	DCR-30	372/5300/30	£42.00N

Decapper jaws

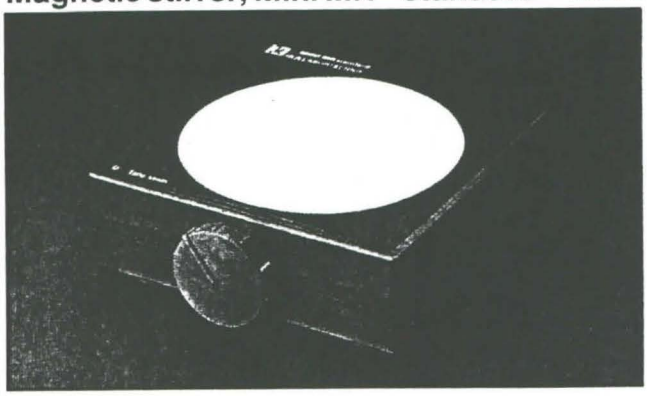
Jaw Size	*Chromacol No.*	Cat. No.	Each
8 mm jaws	DCB-8	372/5310/08	£210.00N
11 mm jaws	DCB-11	372/5310/11	£216.00N
20 mm jaws	DCB-20	372/5310/20	£233.00N

Vial trays

Description	Pack	*Chromacol No.*	Cat. No.	Price
Holds 10 22mm dia. vials	1	T-10/20	372/4000/06	£31.00N
Holds 15 12mm dia. vials	1	T-15/302	372/4000/08	£31.00N
Holds 15 6-8mm dia. vials	1	T-15/308	372/4000/10	£31.00N
SCI-RAK, Aluminium 210×134mm Holds 104 vials with 12mm o.d. by 32mm	5	T-104	372/4000/12	£43.00N
SCI-RAK Aluminium Holds 180 vials	5	T-180	372/4000/16	£41.00N

FIRST AID
See page 4 - 959 in the Safety Section of this catalogue.

Magnetic stirrer, Mini MR – standard IKA

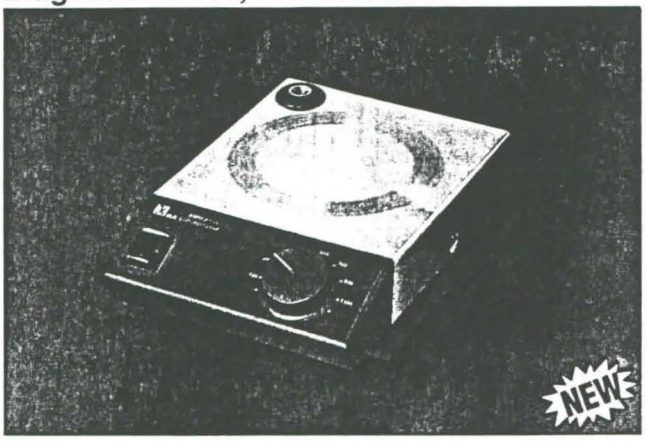


A small powerful magnetic stirrer without heating, for volumes up to 800ml. Variable speed from 0 to 1500rpm. White surface is ideal for titrations. Overall dimensions, w×d×h, 115×130×44mm. Working surface area 115×130mm. Weight 0.23kg. Suitable for operation on 80-230V, 50/60Hz.

Cat. No. 333/0276/00

Each £83.00N

Magnetic stirrer, KMO-2 basic IKA



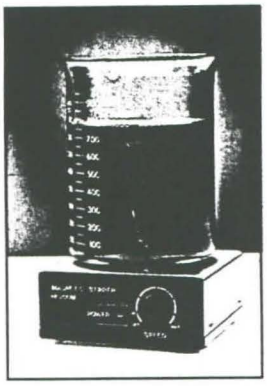
A small powerful magnetic stirrer with stainless steel housing. For volumes up to 5 litres. Variable speed up to 1100rpm.

Overall dimensions, w×d×h, 140×200×75mm, weight 1.7kg. Enclosure to IP21(DIN40050). Suitable for operation on 230V, 50Hz.

Cat. No. 333/0253/00

Each £173.00N

STIRRING BARS – see page 4 - 1090



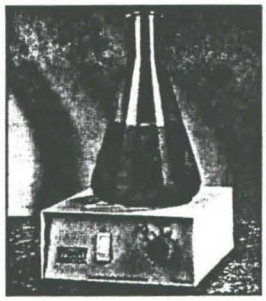
Magnetic stirrers, mini HI

- *Low cost stirrers, 1 and 2.5 litre capacity*
- *Variable speed control*

High quality magnetic stirrers with variable speed control and choice of either 1 litre or 2.5 litre capacity. Low cost HI-190M has plastic cover which will resist harmful effects of chemicals accidently spilled. 2 year guarantee on all models.

Specifications

Model	HI-190M	HI-200M	HI-300
Capacity Cover type Dimensions	1 litre Plastic 120×120×45mm	1 litre Stainless steel 120×120×45mm	2.5 litre Stainless 180×180×
Speed range Power	100-1000rpm 220-240V, 50-60Hz		
Cat. No.	**333/0230/02**	**333/0230/04**	**333/**
Each	£53.53V	£82.25V	£108.00V

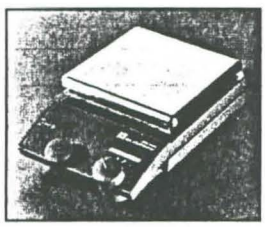


Magnetic stirrer, rectangular

Variable speed to 1300rpm electronically controlled, employing powerful magnetic operation. Top dimensions 215mm provides ample space large vessels. Supplied with each 20 and 40mm PTFE as follows. For use on 220/240V 50Hz supply.

Cat. No. 333/0058/00

Each £126.82N



Magnetic stirrer, REO basic

- *Constant rpm even if viscosity changes*
- *Optoelectric speed control*

A variable speed stirrer up to a maximum 1100rpm. The optoelectronic speed control continually monitors set and actual speed, ensuring constant rpm during any change in viscosity up to 1000mPa/sec. Maximum stirring volume 20 litres (for fluids of low viscosity). Overall dimensions (w×d×h) are 155×235×118mm, weight 2.4 kg.

Cat. No. 333/0282/00

Each £249.00N

STIRRING BARS (FOLLOWERS)

A range of followers is offered:
Glass covered bars (Cat. No. 333/0034) are suited to general routine stirring at lower speeds.
Polypropylene coated bars (Cat. No. 333/0036) are resistant to a limited range of chemicals, and suitable for use to approximately 130°C.
PTFE or Teflon have a low coefficient of friction, are resistant to almost all chemicals and can be used continuously to 260°C, intermittently to 315°C.

Stirring bars, glass

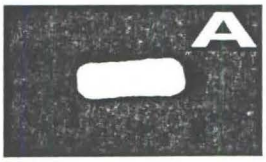
For use with magnetic stirrers. Magnetised core enclosed in glass.

Size of magnet, mm	Size overall, mm	Cat. No.	Each for 10	Each
19×3.5	25×6	333/0034/01	£0.68	£1.23P
24×3.5	30×6	333/0034/02	£0.70	£1.27P

Stirring bars, polypropylene

For use with magnetic stirrers. Magnetised core enclosed in polypropylene.

Size of magnet, mm	Size overall, mm	Cat. No.	Each for 10	Each
19×3.5	25×6	333/0036/01	£0.61	£1.09P
29×5	35×8	333/0036/02	£0.85	£1.55P
32×4.5	40×8	333/0036/03	£0.94	£1.68P
52×5.5	60×10	333/0036/04	£1.57	£2.81P



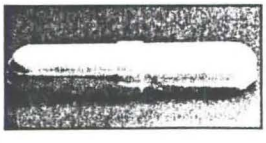
Stirring bars magnetic

NALGENE®

- *Ideal for mixing in small volume containers*

Microsize. Magnetised core in Teflon TFE case. For mixing in small containers, vials, test tubes etc. **Autoclavable.** Excellent chemical resistance, withstands temperatures up to 260°C.

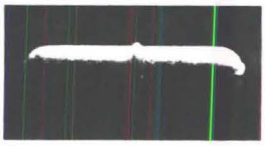
Dia.×length, mm	N. Ref	Cat. No.	Each for 10	Each
2×7	6610-0207	333/0035/01	£4.44	£5.00R
3×10	6610-0310	333/0035/02	£4.74	£5.34R



Stirring bars, PTFE

For use with magnetic stirrers. Immune from leaks or weak spots. All sizes offer the advantage of the centre spinning ring. Powerful magnetic core.

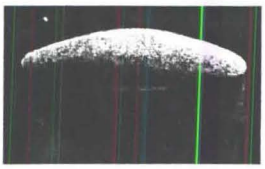
Length mm	Diameter mm	Cat. No.	Each
13	8	333/0041/01	£0.85J
15	8	333/0041/02	£0.88J
25	10	333/0041/03	£1.21J
35	10	333/0041/04	£1.61J
50	10	333/0041/05	£2.36J
65	13	333/0041/06	£3.46J
75	13	333/0041/07	£3.94J



Stirring bars, PTFE

For use with magnetic stirrers. Magnetised core enclosed in PTFE.

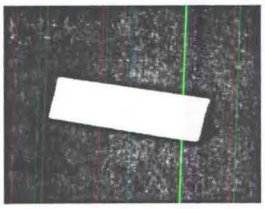
Size of magnet, mm	Size overall, mm	Cat. No.	Each for 10	Each
30×4	35×8	333/0038/01	£1.00	£1.50P
40×4	45×8	333/0038/02	£1.14	£1.76P
8×3	12×6	333/0038/03	£0.61	£0.93P
16×3	20×6	333/0038/06	£0.68	£1.03P
25×3	30×6	333/0038/04	£0.81	£1.24P
50×6	60×10	333/0038/05	£1.87	£2.84P



Stirring bars, egg shape

An elliptical magnet is encased in a seamless Teflon coating. For stability at high speeds in round bottom flasks orvessels.

Length, mm	Diameter, mm	For flask size, ml	Cat. No.	Each
10	5	10 & 25	333/0043/01	£1.15
15	6	50 & 100	333/0043/02	£1.21
25	10	100 & 200	333/0043/03	£1.61
30	10	300 & 500	333/0043/04	£1.99
35	13	300 & 500	333/0043/05	£2.38
50	17	500 & 1000	333/0043/06	£5.07
70	27	2000 & 5000	333/0043/07	£10.2



Stirring bar, PTFE, triangular

Particularly effective for dissolving solids and mixing sediments because of the scraper-like action on the bo of the container.

Length×side, mm	Cat. No.	Each
12×6	333/0049/02	£0.94P
25×8	333/0049/04	£1.23P
40×14	333/0049/06	£1.88P
55×14	333/0049/08	£2.53P

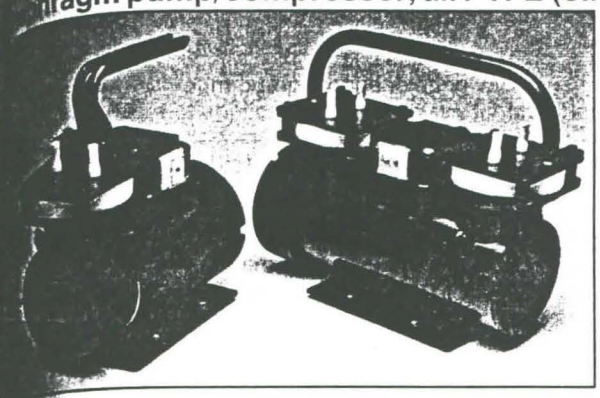
Stirring bars magnetic

- *Fins for superior mixing*
- *Outstanding chemical resistance*

Magnetic stirrers with magnetised core in Teflon case. **Autoclavable.** Outstan chemical resistance, use up to 260°C. Symmetrical stirring fins at top and bottom for superior agitation. Develops a strong mixing vortex even low stirring speed in flat or round bottom vessels.

Dia.×ht, mm	N. Ref.	Cat. No.	Each
10×8	6600-0010	333/0039/01	£6.87
14×12	6600-0014	333/0039/02	£6.87
17×13	6600-0017	333/0039/03	£6.87
22×15	6600-0022	333/0039/04	£7.69
30×12	6600-0030	333/0039/05	£8.63
35×12	6600-0035	333/0039/06	£9.99
40×14	6600-0040	333/0039/07	£14.8
58×15	6600-0058	333/0039/08	£23.5

ragm pump/compressor, all PTFE (oil free)



Charles Austen chemically resistant all PTFE portable oil-free diaphragm pumps for laboratory benchtop use. With all the contact parts in solid PTFE and PVDF connectors they are ideal for use with corrosive gases and vapours in the most demanding applications including gel drying and distillation. Compact and lightweight with a convenient carry handle they are easy to maintain and service. Model SEP is a single headed pump, while the double headed version DEP can be parallel or series connected at choice (see performance details below).

ions and ordering information

	Flow l/min	Vacuum mbar ABS	Vacuum mm Hg	Pressure Bar	Pressure kPa	Dimensions mm	Max kg	Cat. No.	Each
SEP	20	60	715	1.0	100	195×130×230	5.5	**326/0197/00**	£427.67N
DEP Connected	20	15	748	1.0	100	250×130×285	6.5	**326/0197/02**	£727.39N
DEP Connected	38	60	715						

kit, contains diaphragm valves and seals

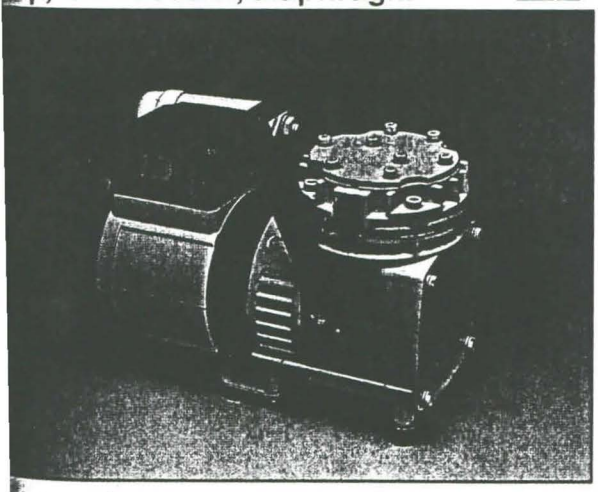
	Cat. No.	Each
SEP) Cat. No. 326/0197/00	**326/0197/04**	£73.45N
(DEP) Cat. No. 326/0197/02	**326/0197/06**	£144.24N

VACUUM/PRESSURE DIAPHRAGM PUMPS, KNF

ragm pumps 100% oil free for vacuum or pressure. oise levels, maintenance-free, suitable for bench top the laboratory and for continuous operation.

Typical applications include:
- Membrane filtration
- Vacuum moulding
- Aeration
- Assisted filtration techniques

mp, low vacuum, diaphragm



Model N022AN.18. This pump has an aluminium head neoprene diaphragm and stainless steel valves. Fitted carrying handle, rubber feet, on/off switch and 2m s cable with plug. Inlet/outlet tubes 6mm OD. For tion on 230V, 50Hz.

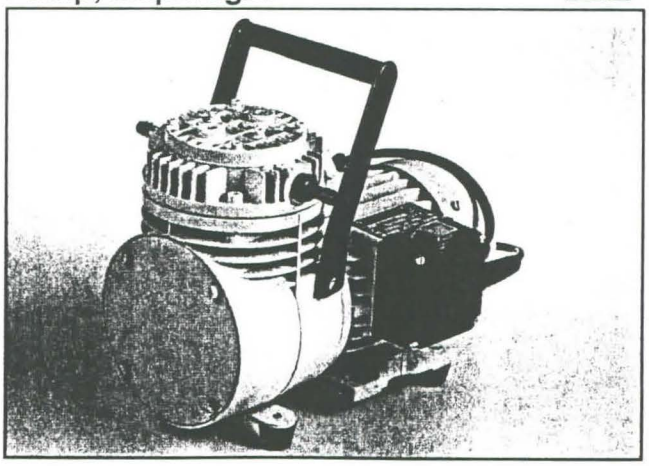
ication

ite	0.9m³/hr (15 l/min)
n	100mbar
re	4bar
sions (w×d×h)	230×145×190mm

326/0127/00

£335.44N

Pump, diaphragm



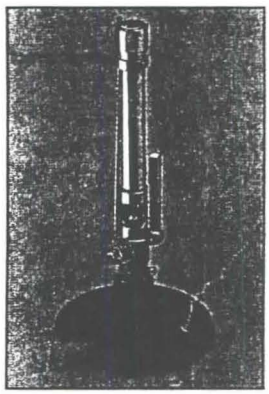
KNF Model N035AN.18. This pump has an aluminium head with neoprene diaphragm. Fitted with carrying handle, rubber feet, on/off switch and 2m mains cable. Outlet tubes 9mm OD. For operation on 240V, 50Hz.

Specification

Flow rate	1.68m³/hr (28 l/min)
Vacuum	100mbar
Pressure	4bar
Dimensions (w×d×h)	280×143×225mm
Mass	9.5kg

Cat. No. 326/0128/00

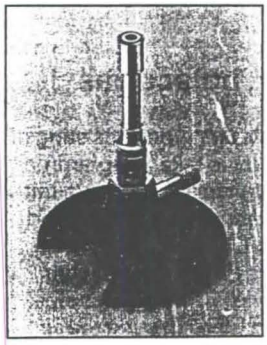
Each **£460.65N**



Bunsen burner, natural gas

As Cat. No. 218/0181 but with adjustable permanent pilot flame and main burner controlled by a positive action lever operated valve in the base. Cannot accept flame spreader.

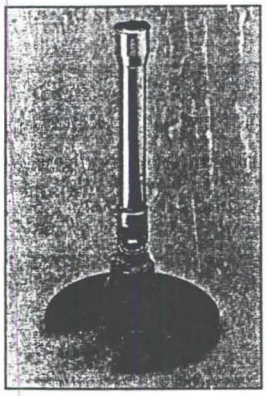
Cat. No. 218/0187/00
Each £31.62J



Bunsen burner, natural gas

Micro pattern with air and gas regulator and normal size nozzle for 6.5mm rubber tubing. Plated brass tube, base finished in acrylic gloss paint. Outside diameter of tube 5mm.

Cat. No. 218/0190/00
Each £13.65J



Bunsen burner, LPG

Fine tolerance jet with regulator. Inlet tube 10mm, outlet 12.5mm diam. For flame spreader see Cat. No. 218/0675/00 page 4 - 162.

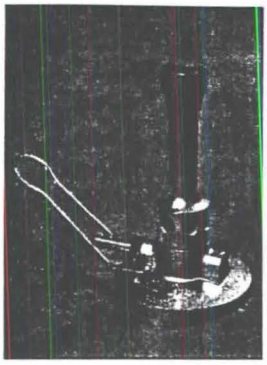
Cat. No. 218/0428/00
Each £6.71J

Gauzes - see page 4 - 543

Mats - see BENCH PROTECTION, page 4 - 95

Triangles and **Tripods** - see STANDS, page 4 - 1077

AMAL BURNERS



Burner, natural gas

Amal Minor. Diameter of head 25mm, height 133mm, mounted on a round base with carrying handle.

Cat. No. 218/0205/00
Each £54.31J

Burner, natural gas

Amal Major. Diameter of head 43mm, height 180mm, mounted on a round base with carrying handle.

Cat. No. 218/0210/00
Each £66.70J

Burner, natural gas

Amal Maximus 3-Jet. Diameter of head 69mm, overall height 185mm, mounted on a round base with carrying handle.

Cat. No. 218/0212/00
Each £146.30J

APPENDIX 5

COST ESTIMATION FOR THE VETERINARY VACCINES LABORATORY – KABUL 21/07/1998 – ICRC

→ ECOSOC / ROD

~~REF~~ FOR JEAN-CLAUDE
F. YOUR INFO.

THE ANIMAL & HUSBANDRY VACCINES LABORATORY - KABUL

MARC 4.4.98

REHABILITATION WORK - COST ESTIMATION

Kabul 21 .07. 1998

100. Masonry :

a) - to fill with the brick existing door-way : dim. 195 x 250 cm x 40 cm ----------
b) - to open a new door-way : dim. 100 x 208cm - ----------
c) - cement plaster of the art. a, b , and d : dim. 22.0 m2 ----------
d) - to close with the brick shower partition : dim. 4.5 m2 (thick. 12 cm) ----------

100.0 $

200. Carpentry :

e) - new inter. wooden cellular-core door : dim. 100 x 208 cm - pc 1 - ----------
f) - to create a spy- window in exist. doors : dim. 20 x20 cm - pc 8 - ----------.
g) - to build in the exist. niche a cupboard
in hardboard, with 4 doors & shelves : dim. 120 x 250 cm - pc 5 - ----------
h) - to glaze in the window & door block : dim. m2 ----------

920.0$

300. Painting :

i) - oil paint on wall & window : dim. ----------

j) - white wash with 50% plastic paint
on wall & ceiling - rooms 3 to 6 : dim. ----------

230.0$

400. Floor finishing :

k) - to lay a linoleum in rooms 6 to 11
and in the corridor : dim. 130 m2 ----------

950.0$

500. Electrical installations :

l) - to install double neon lighting : pc 11 ----------

165.0$

600.Sanitary installations :

m) - sanitary installations in the laboratory ----------
n) - sanitary installation - exterieur work - septic tank

395.0$
550.0$

TOTAL **3310.0$**

A.Meissner arch. /ICRC constr.

APPENDIX 6

INVENTORY OF THE EXISTING CHEMICALS AND EQUIPMENTS IN THE LABORATORY OF KABUL

INVENTORY LIST OF CHEMICALS IN THE VET VACCINE PRODUCTION SUPPORTED BY ICRC.

No	Name of thechemicals	Amount	Remarks
1	Magnesium chloride	500gms.	
2	Amoniam sulphate	1kg	
3	Potassium dichromate	1kg	
4	Lactalbomine hydrolysate	1lb	
5	Nutrient agar	2lbs	
6	Briliant crystal blue	10gms	
7	Agar	500gms	
8	Thiomersal	100gms	
9	Potassium iodide	500gms	
10	McConky agar base	1lb	
11	Oil immersion	100ml	
12	Phenol red	25gms	
13	Crystal violet	100gms	
14	Safranin	25 gms	
15	Methlene blue	25gms	
16	Bactone peptone	2lbs	
17	Tryptose blood agar base	3lbs	
18	Saponin	1kg	
19	Pyrogalol	200gms	
20	Saponin white	500gms	
21	Purified agar	100gms	
22	Geimsa stain	25gms	
23	Methyl violet	10gms	
24	Chloral hydrate	500gms	
25	Lablemco	500gms	
26	Complement fixation test tablets	100gms	
27	Eosin	25 gms	
28	Maltose	500gms	
29	Phenol	1kg	

30	Sod chloride	1kg	
31	Saboraud,s dextroseagar	500gms	
32	Peptone	500gms	
33	Natriumdihydrogen phosphate	1kg	
34	Potassium dihydrogen phosphate	500gms	
35	Di natrium hydrogen phosphate	1kg	
36	Sod. sulphate	500gms	
37	Sod.azide	100gms	
38	Glucose	3kgs	
39	Phenol liquid	2 liters	
40	Dittol	3 liters	
41	Sulfuric acid	2.5 liters	
42	Formaline	6liters	

INVENTORY LIST OF THE INSTRUMENTS AVAILABLE IN VET VACCINE PRODUCTION SUPPORTED BY ICRC.

No	Name of the instrument	Number	Used for
1	Autoclave(medium)	one	25 years
2	Portable Autoclaves	two	10 years
3	Hot air oven(medium)	one	20 years
4	Water Distillation machine	one	1year
5	Water boiler	one	1 year
6	Printing machine	one	26 years
7	Incubator	one	>30years
8	Incubator	one	7 years
9	Capping machine	one	one year
10	Compound microscope	one	7 years
11	Refrigerator	one	5 years
12	Electric balance	one	1 years
13	Mechanicyl balance	one	5 years
14	Electric sterilisator	two	15years
15	Mechanical balance(small)	one	5years

APPENDIX 7

PROTOCOLS OF PRODUCTION OF BACTERIAL VACCINES IN KABUL

PROTOCOL FOR PRODUCTION OF ANTHRAX SPORE VACCINE IN MINISTRY OF AGRICULTURE LABORATORY SUPPORTED BY ICRC KABUL

1. An ampoule of a valid vaccine strain (sterne strain 34f2) is aseptically broken. The content is dissolved with sterile Nutrient Broth (NB) which again is mixed aseptically. Then subcultured in NB, Nutrient agar(NA) Blood Agar(BA), Robertson,s cooked meat media, and Sabouraud,s dextrose agar. Beside that a smear is made for Gram`s staining.
   Media are incubated over night (O/N). Smear is examined for percentage of spore, vegetative and possible contamination.
2. The incubated media is checked for characteristic growth of strain the next day. A Motility test is also conducted on NB culture.
3. A sub culture is made from NB to NA plate and is incubated O/N.The growth in plate is examined under low power of microscope for characteristic Medusa head growth. Then three colonies are selected of which smear is made from with in the colony. The colony which shows the sign of sporolation is selected for subculture.

4. The seed culture is made in a flask of nutrient broth the size of which depend on the number of Roux flask of nutrient agar prepared for mass culture, sterilised and incubated O/N. The broth is examined for purity.
5. The Roux flasks containing NA, PH 7.2 prepared a day before are seeded with 2 ml of inoculum. Incubated for 96 hours at 37°. Then it is taken out of incubator and kept at dark room temperature for 72 hours.
6. The growth after being examined physically and microscopically is harvested in Merthiolet saline (Harvest). The harvest is examined for purity and percentage of sporolation. The rate of sporolation must >95 %. Merthiolet saline consist of:

-Distilled water	One liter.
-Sod.chloride	five grams.
-Merthiolet	0.05gm.

Note: Saline is sterilised first, Then Merthiolet is added infront of flame.

7. The harvest is further incubated O/N. Thereafter it is kept at +4°c.
8. The harvest is shaken for 5-10 mins. every day until 21st. day.
9. On 7th day after thorough shaking by hand, one millilitre of the concentrate (harvest) is diluted in 4 ml of sterile Normal saline(NS). Then two adult Guinea pigs,weighing about 300-350 grams are injected by S/c route with 0.5 ml of the suspension. They are observed for 5-7 days. There should not be any untoward reaction.
10. Step(9) is repeated on 14th day.
11. On 21st day a spore count is conducted.
12. Based on the Number of spore / ml of concentrate, saponin saline is calculated.
    Saponin consist of :

Distilled water	1000 ml.
Sodium chloride	5gms.
Saponin	2.5 g
Merthiolet	1/ 20000

This is sterilised in 121c° at 15 pound for 40 minutes.

13. In front of the flame the required amount of concentrate is added to saponin saline to adjust the spore content at the level of 10000000 / ml.
14. The vaccine is dispensed in bottles of 50 ml.
15. Sterility of the vaccine is conducted by:
    - -Physical appearance.
    - -By smearing from the vaccine.
    - -Final spore count, to have the required amount of spore per ml. Overages added to make for the loss during transportation and storage.
    - -Inoculation to Nutrient media like: Nutrient agar, Nutrient broth, Blood agar, Robertson's cooked meat media, and Subouraud,s dextrose agar. Incubated for five days in 37c° and room temperature respectively. No contamination should be observed.

SAFETY TEST:

1. The safety of this vaccine is conducted in three unvaccinated sheep, bought from the market before being vaccinated. The sheep are reared thereafter in the premises of vaccine production itself until use.
2. The selected animals for the test is under observation three days before inoculation. The temperature is recorded morning and evening.
3. With all necessary precautions, The sheep are inoculated an amount of **0.5, 1.0, and 5.0 ml S/C.** The temperature of animals are recorded morning and evening. There should not be big changes except for a slight rise of general temperature and slight swelling and lameness for a day or two. The temperature is recorded for 15 days.

The dose for this vaccine is 0.5 ml for sheep and 1.0 ml for cattle, route of inoculation S/C, expiry- one year after manufacture, Keeping temperature at +4-8c°, To be shaken well before inoculation, annual repeated inoculation is needed.

ECONOMIC STUDY: For preparation **100 ml** concentrate

1. Requirement (media)for seed culture	20000AFS.
2. Media for mass culture	50000AFS.
3. Merthiolet	20000AFS.
4. Saponin	10000AFS.
5. Distilled water	2000AFS.
6.Electricity and water	50000AFS.
7. Detergent	10000AFS.
8.Transport	10000AFS.
9. Stationary	10000AFS.
10. Salary	150000AFS.
11. Sheep	100000AFS.
12.Maintenance	5000AFS.

13. Cold chain	10000AFS.
14.Glassware	20000AFS.
15. Equipment	50000AFS.
TOTAL	**472000 AFS**/100ml concentrate.

100 ml concentrate will give 40000 doses.
472000 divided by 40000= 12 AFS.
One bottle of 100 doses cost 1200 AFS.

The nearest counterpart for our vaccine is Pakistani Anthrax vaccine which costs Rs.53/100 doses. The vaccine produced in ICRC supported vet vaccine production is approximately 1200 Afs / 100 doses. This is equivalent to about 1.5 Pakistani Rupees. The Uraguay manufactured vaccine is costing 1.7 USD for each 100 doses.
The selling price would be to match the market price.

Table of comparison of cost /dose of various vaccines from diffirent manufacturers.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245		
4	Heamorrhagic septicaemia vaccine	669		
5	Sheep pox vaccine	4		
6	Fowl pox vaccine	14		
7	Newcastle vaccine	10		
8	Sal pullorum antigen	4		

Each USD equals 42000 Afs.

Indicator:

1. kv (Kabul vaccines).
2. pv (Pakistani vaccines).
3. ov (Other vaccines).

BEST REGARDS
VET AND HUSB TEAM

ENTEROTOXAEMIA VACCINE AND ITS ECONOMIC STUDY

Strain used : Cl.welchi Type D.

The vaccine is produce as follows:
Seed culture : A highly toxigenic strain of Cl.welchi type D I.V.R.I India.
Method of Production:
Medium used:

The equal parts of Beef and liver infusion is adjusted to PH 9.6 while hot. Steamed for ten minutes in steam steriliser. It is filtered clear and to the clear filterate is added 2 % bacterialogical peptone and the PH is readjusted to PH 8.2.
Chemically pure sodium chloride to a final concentration of 0.5 % is now added and the medium is buffered with 0.4 % dibasic potassium phosphate(k2HPO4).

The medium is sterilised in running steam for about 45 minutes on each of three consecutive days. Fermentable sugarin the form of dextrose to a final concentration of not more 0.2 % is added at the time of inoculation of the production flasks with young (5 hours growth) actively growing culture of Cl.welchi type D in a similar medium. An increase in concentration dextrose up to o.5 % in the seed medium for growing seed culture for inoculation in to the production flasks will be beneficial.The production flasks are cooled to 37c° on 3rd day after sterilisation just before inoculation. The bulk of inoculum in the seed medium of actively growing culture should be between 2-3 % of the medium contained in each of the production flasks.

Active growth with large gas production, starts wtith in about three hours of inoculation and continues as such for a time up to about 6-8 hours. Growth stops by about 24 hours after which the flasks are removed and tested for purity and aerobic sterility by microscopical and cultural examinations.

The PH of the product at this stage is almost usually neutral. About five ml of the product from each flasks is removed asepticall and pooled for testing mice. Atleast two mice each is inoculated I/V with 0.2 ml of the clear centrifuged product(pooled sample) and they usually die with in about 8-24 hours.

A good quality trypsin(merck) is added to the production flasks(after removal of the sample for testing the mice) to a final concentration of 0.25 %and mixed thoroughly with the culture and the flasks are again incubated at 37c° for one and half hours. Two ml of the product is removed again, pooled and centrifuged.

The clear supernatant is injected I/V in a dose of 0.01-0.1 ml in to mice. That will kill mice with in a short time indicating that the epsilon toxin present in the product in the form of protoxin before the treatment with trypsin, has now been converted to epsilon toxin.

Dilutions are made, using sterile normal saline with the pooled bacteria free clear toxinand the lethal dose per ml of the product is determined. This varies from 1000.8000 mouse mld/ml depending upon the type of animal from which the meat and liver is collected for media preperation, quality of peptone used, variation in the bacterial population in the seed and production flasks and also quality of trypsin used for activation etc.

Immediately after removal of production flasks from incubator after activation with trypsin, the product is pooled ans formalised to the concentration of 0.5 %and incubated at 37c° till the product become atoxic to the mice in a dose of 0.2 ml I/V, this period has been found to be from 11-18 days.

The product is bottled in sterile bottles with aseptic precautions infront of flame, stoppered with sterile rubber corksand kept in 1-5c° till tested for sterility, safety, ans potency and issued.

Sterility Test:

Random samples are tested for sterility by inoculating a sample of product in aerobic anaerobic media and observed for five days kept inthe incubator at 37c° all the time.

Safety test:

At least eight sheep and or 12 Rabbits (depending upon the availibility of the animals) are used for testing the safety test and potency of each brew of vaccine. Two sheep each recieved S/c 10 ml and the other six sheep each recieves 2.5 ml s/c of the product. The Rabbits are each given s/c a dose of five ml. Their morning and evening temperature are recorded for at least five days. During this period they show no systemic reaction and only a minimum of local reaction.

The sheep recieving 10 ml doses are discontinued from experiment after five days.Each of the other other six sheep are inoculated with a second dose of 2.5 ml of the same products not earlier than 14 days after the reciept of first inoculation.

MATERIALS USED ON PRODUCTION OF ONE LITER OF ENTEROTOXEAMIA VACCINE

	Material	Amount	AFS/cost	USD/cost
1.	Distilled water	1000 ml	500	0.01
2.	Liver	250 gms	12000	0.3
3.	lean beef	250gms	10000	0.2
4.	Peptone	10gms	10000	0.2
5.	Potassium dihydrogen ortho phosphate	4gms	10000	0.2
6.	Sodium chloride	5gms	1000	0.025
7.	Sodium thioglycholate	1gm	1000	0.025
8.	Dextrose	10gms	1000	0.025
9.	Sodium hydroxide	Qty.sufficient	1000	0.025

10.	Different media used for testing and growth of organism.	Qty.sufficient	2000	0.05
11.	Salary	150000	150000	3.25
12.	Electricity and water charges	6000	6000	0.15
13.	Large and small ex--perimental animals	20000	20000	0.45
14.	Transportation	10000	10000	0.25
15.	Stationary and communi--cation charges.	5000	5000	0.1
16.	Wear out of the building.	5000	5000	0.1
	Total AFS for one liter		245000	5.0

One liter of Enterotoxeamia gives 1000 doses.
One dose costs Afs.245.
One 50 ml bottle costs Afs 12250 That equals=16.5 Pak.RS.

The cost for each 50 doses of Uruguay manufactured Enterotoxeamia vaccine purchased by FAO is 1.164 USD and each dose costs 960 Afs.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245	---------	512
4	Heamorrhagic septiceamia vaccine	669		
5	Sheep pox vaccine	4		
6	Fowl pox vaccine	14		
7	Newcastle vaccine	10		1,144
8	Sal.pullorum antigen	4		

Each USD equals to 42000 Afs.

Indicators:
kv-Kabul vaccine.
pv-Pakistani vaccine.
ov-Other vaccine.

BEST REGARDS
VET AND HUSB TEAM

PROTOCOL FOR PRODUCTION OF BLACK LEG VACCINE AND ITS ECONOMIC STUDY

1. Composition:

Organism	Source	Strain	Properties
Cl.chovoie.	IVRI	no.49	50 %
Cl.septicum.	IVRI	no.51	50 %

2.The organism intended forBQand Malignant oedema vaccines production are examined microscopically and culturally for evidence of aerobic contamination. Biochemicl and animal inoculation tests are made annually or more frequently. If necessary organism used is to conform to classification in Bergey,s Manual of determinative Bacteriology.

3. The purity of the organism is determined by microscopic examination. The virulence of the organism is maintained by passage through susceptible animals, e.g.Guinea Pigs.

4. Medium for seed culture:

1. The medium used for growing the seed culture shall consist of :

Distilled water(DW)	1000 ml.
Liver tissue	250gms.
Muscle tissue	250 gms.
Peptone	10 ms.
Potassium hydrogen phosphate (dibasic)	4 gms.
Sodium chloride	5 gms.
Sodium thioglycholate	1 gm.
Dextrose	10 gms.

* Grind the meat finely and boil in DW for 15 minutes until thoroughly cooked. Filter through muslin cloth to remove the meat particles and disolve the chemicals in the filtrate.
* Heat to just below the boiling point and adjust the PH to 8.2-8.4.
* Filter through filter disks or by some other suitable method and distribute the filtrate in to cotton stoppered large tubes or small flasks. These tube or flasks may contain one inch of the residue, if desired.
* Sterilise in the autoclave at 15 pound pressure for 20 minutes.
* Medium not used with in 24 hours after sterilisation is heated to drive off absorbed oxygen, cooled to 37c° and immediately plated. Medium older than seven days is discarded.

MEDIUM FOR CULTURE:

The media used for production of the vaccine shall consist of liver-muscle-chemical bouillon as per following composition:

Distilled water(DW)	1000 ml.
Liver tissue	250gms.

Muscle tissue	250 gms.
Peptone	10 ms.
Potassium hydrogen phosphate (dibasic)	4 gms.
Sodium chloride	5 gms.
Sodium thioglycholate	1 gm.

* Procedure of grinding, boiling, filteration and filling in to the flask of 3-5 liters or bigger bottles e.g 20 liter bottles.
* Sterilise in the autoclave at 15 pound for 30 minutes and incubated over night at 37c°.
* The production flask may be planted upon cooling at 37c° or restored in the incubator and planted the following day. Medium not planted with in 24 hours of sterilisation is not to be used.
* At the time of planting the production flasks sufficient sterile 50% Glucose solution is added to the medium to make a final concentration of 0.5 %. The glucose solution is prepared as follows:

DW	10000 ml.
Glucose	500 gms.

Bring it to a boil and transfer aseptically to a presterilised cotton stoppered flasks or tubes.

* Inoculation of production media is carried out as follows:

(a)At least two daily transfers are made from the stock culture prior to inoculating the production flasks, incubation of the seed matterial may be prolonged to 48 hours, if necessary to obtain satisfactory growth.

(b) The inoculation of the flask containing the production medium is accomplished by directly transferring the content , at least 100 ml of the seed culture in to the production flasks under the flame of bunsen burner in a closed room.

(c) Each strain of the organism is grown separately and only tubes showing good growth are used as seed culture.

* The production flask are grown at 37c° for a period of 3-5 days or until good growth is obtained.
* The product is prepared as follows :

(a)After the production culture have been incubated for the required period the flasks are removed from the incubator and a microscopic examination made on samples taken from each. Those showing contamination or suspecious atypical growth are heat sterilised and discarded.

(b)Flasks found to be satisfactory are vigorously shaken and the growth is strained through sterile gauze in to a graduated cylinder and subsequently transferred to a mixing co--tainer.

(c)Equal volume of Cl.chauvoei and Cl.septicum are combined in mixing container.

(d)A sufficient amount of 10 % formalin saline solution prepared by adding 100 ml of stock(35-40 %) formaldehyde solution to 900 ml of sterile distilled water is added to the culture combinatiom to yield a concentration of 0.5 % formalin by volume in the product.

(e)The product is thoroughly mixed and may be bottled immediatly or permitted to stand at room temerature for 24-96 hours before filling in to the containers.

* The product is not standardised by nephelometry or bacterial count.
* The preservative consist of 0.5 % formaline by volume.
* The batch of serial number is ascertained at the time of formalisation. The average volume of the serial is 15000 ml.

The following tests are conducted on the finished products :
(1) Sterility test: A sterlity test is conducted on the finished product from 3 % (not to exceed 10) of the final containers by inoculating 0.5 ml and 1 ml of the productin to each of two tubes containing the following media :
Nutrien broth, Blood agar, Nutrien agar, Robertson,s cooked meat media and suboraud,s dextrose agar.
Batches of vaccine found to contain living bacteria may be held in at room temperature or 37c° incubator for 24-96 hours, after which period a retest is conducted.

Potency test:
At least six susceptible Guinea pigs shall be inoculated with 3 ml of the product. Fourteen days later, at least three of the vaccinated animals to either with two control will be challanged with Cl.chauvoei and the remaing three or more vaccnated animals together with two controls will be chalanged with Cl.septicum. All the control animals should die with in 96-144hours, while the vaccinated animals should all survive.

Safety test :
The vaccinated animals used for potency test will will suffice for safety test. These animals should remain well during thier vaccination period.

All tests are to be completed and recorded before any of the product is released for distribution and use. All batches or portions thereof on which satisfactory tests are not obtained are to be discarded in such a manner as to be safe.
* The product is prepared in liquid form only and is filled into 50, 300, and 500 ml bottles. The bottles are sealed with sterile rubber skirt stoppers.
* An expiration date of one year is given, calculated from the earliest date of harvest of the production culture obtained in the batch, provided the product is stored in the dark at a temperature below 45 f°.
* The product is recommended for the prevention of black quarter (Cl.chauvoei) and malegnant oedema(Cl.septicum)infections in cattle and other ruminants.The recommended dose is 5ml for calves of all ages and 2-3 ml to sheep and goats.

MATERIALS USED ON PRODUCTION OF ONE LITER OF BLACK QUARTER AND MALIGNANT OEDEMA VACCINE

	Material	Amount	AFS/cost	USD/cost
1.	Distilled water	1000 ml	500	0.01
2.	Liver	250 gms	12000	0.3
3.	lean beef	250gms	10000	0.2
4.	Peptone	10gms	10000	0.2
5.	Potassium dihydrogen ortho phosphate	4gms	10000	0.2
6.	Sodium chloride	5gms	1000	0.025
7.	Sodium thioglycholate	1gm	1000	0.025
8.	Dextrose	10gms	1000	0.025

9.	Sodium hydroxide	Qty.sufficient	1000	0.025
10.	Different media used for testing and growth of organism.	Qty.sufficient	2000	0.05
11.	Salary	150000	150000	3.25
12.	Electricity and water charges	6000	6000	0.15
13.	Large and small ex--perimental animals	20000	20000	0.45
14.	Transportation	10000	10000	0.25
15.	Stationary and communi--cation charges.	5000	5000	0.1
16.	Wear out of the building.	5000	5000	0.1
Total AFS for one liter			245000	5.0

One liter equals to 333doses
One dose equals=405Afs
One 50 ml bottle costs Rs.30.

Each 300ml Pakistani BQ vaccine which is equal to 60 doses costs Rs.62.28. Thereby each dose costs 882 Afs.
The Uraguay manufactured vaccine costs 900 Afs / dose.
Note : BQ vaccine produced by MADERA produces immunity against Black leg disease only but the BQ vaccine produced by ICRC supported Lab produces immunity against Malignant oedema also.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405	882	882
3	Enterotoxaemia vaccine	245		
4	Haemorrhagic septicaemia vaccine	669		
5	Sheep pox vaccine	4		
6	Fowl pox vaccine	14		
7	Newcastle vaccine	10		
8	Sal pullorum antigen	4		

BEST REGARDS
VET AND HUSB TEAM

PROTOCOL OF PRODUCTION OF HEAMORRHAGIC SEPTICEAMIA DENSE SUSPENSION BACTRINE

1. Passage of strain every 15 days by I/P route in mice. Organism harvested from the heart of injected mouse and maintained in blood agar(BA) in +4°.Annex-1.
2. Testing of the colony by slide agglutination test against antiserum for formation of floculation(floculation test).
3. A single colony of Pasteurella multocida on BA is selected and transfered to a Nutrient broth(NB) test tube(Annex-2).
4. The 18 hours growth of NB is transfered to a 500 ml NB flask after testing by Gram staining.
5. The 18 hours broth culture after test for purity is transfered to a 10 liters broth for mass culture and incubated over night.
6. The growth is formalised by formaldehyde at the rate of 0.5 %.
7. The turbidity of the dense suspension harvest is adjusted to tube No.7 of Brown,s Opacity tubes. If needed diluted is diluted with formalinised saline.
8. The PH is adjusted to 6.5 and hot 20 % solution of Potash alum added to give a final 1 % alum.
9. After over night(O/N) storage with agitation the vaccine is bottled for use in the field.

The following tests are conducted on the bactrine:

A. Sterility test.
B. Safety test.

Sterility test:

1. By smear after Gram staining. No other organism should be observed, live or dead.
2. On media.
   The following media are used in this lab for sterility testing so far;
   -Blood agar.
   -Nutrient agar.
   -Robertsons,s cooked meat media.
   - Saboraud,s dextrose agar.

Sterility test is conducted for five day. In this case no growth of any kind should be observed. Sometimes as a counter chick a further sub culture of Robertson,s cooked meat media is done and maintaine for another five days. Again there should not be any growth.

Safety test:

This test is so far conducted on Rabbits only. That is, three adult, unvaccinated, healthy Rabbits are taken. Vaccine is given to them by S/c route on the buttock. One Rabbit will recieve 5 ml, second one will recieve 2.5 ml of vaccine. The third will act as control. These animals will be observed for 10 days. There should not be any kind of untowards reaction.

To confirm protective effect :
Fifty mice are injected I/M with 0.2 ml of vaccine on day zero and day 14.On day 21 they are divided in to 10 groups of five each being challanged with dilutions of 6-8 hours broth culture of field strain in the range of 10-1 to 10-10 dilutions.
Fifty other unvaccinated mice are also challenged similarly. They are observed for 5 days. The MLD can then be calculated.
A protection of 2 Log unit in the vaccinated mice is an indication of sufficient protection for cattle.

Duration of immunity :
A dose of 3 ml of vaccine in calves 4-8 months old provide immunity of 6-9 months. A booster is required 3-6 months later. Thereafter an annual booster is needed.

ECONOMIC STUDY: (for one liter, Dense suspension culture bactrin)

No	Item	Amount	Cost/Afs
1.	Lean beef	0ne kg	60000.
2.	Pepton	20gms	10000.
3.	Sod.chloride	5.0gms	1000.
4.	Glucose	5.0gms	5000.
5.	Electricity	-	5000.
6.	Water	-	5000.
7.	Ex.animals+feed	-	30000.
8.	Equipment	-	10000.
9.	Glassware	-	10000.
10.	Maintenance	-	5000.
11.	Salary	-	50000.
12.	Sterility test requirement	-	10000.
13.	Stationary	-	10000.
14.	Transportation	-	10000.

TOTAL **Afs 221000.0.**
Each liter of this vaccine give 330 doses
Each dose costs Afs.669.0.
One 50 ml bottle costs 10715 Afs
One 50 ml bottle costs Rs.12.60
One 50 ml bottle costs USD 0.4.

The nearest counterpart to our HS vaccine is Pakistani vaccine. Each bottle of this vaccine of 300ml costs Rs.62.28, and for each dose costs 882 Afs.
The other vaccine is Lelystat vaccine. One 100 dose of this vaccine costs 6.9 USD.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245		
4	Heamorrhagic septiceamia vaccine	669	882	2,900
5	Sheep pox vaccine	4	450	2,180
6	Fowl pox vaccine	14	---------	----------
7	Newcastle vaccine	10	---------	1,144
8	Sal.pullorum antigen	4	----------	----------

Indicators:
kv-Kabul vaccine.
pv-Pakistani vaccine.
ov-Other vaccine.

BEST REGARDS
VET AND HUSB TEAM.

APPENDIX 8

PROTOCOLS OF PRODUCTION OF VIRAL VACCINES IN KABUL

PROTOCOL FOR PRODUCTION OF NEWCASTLE DISEASE VACCINES AND ITS ECONOMIC STUDY

NDV vaccines:

-Newcastle B1.
-Newcastle LA SOTA.
-Newcastle K.

METHOD OF PRODUCTION:

-Chick embryo method.

1. Procurement of fertile, fresh eggs from a form that gauranties 80 % fertility with the least record of mortality in the farm.
2. After following necessary procedures and arranging to keep the eggs in incubator, the eggs are kept in incubator. The incubator is tested 24 hours before being used. It is made sure that the temperature and relative humidity(R.H) is accordingly adjusted.It is then fumigated. The eggs are incubated for nine days.
3. While observing and recording the temperature and R.H, the eggs are shaken 3-5 times every day.the eggs are examined (candled) on fifth day. Infertle eggs are discarded.
4. On the ninth day the eggs are candled again and the living embryoes are confirmed.
5. Air sac of fertile eggs(embryo) marked. With the necessary precaution and aseptic condition Intra allantoic inoculation is performed.
6. Seed culture is prepared. That is a **1:100** of the seed ampule is prepared in sterile normal saline, where upon to every ml of the seed **400 I.U** of penicillin and one mg of Streptomycine is added.
7. To every embryo **0.1 ml** is inoculated and the hole is covered by solid paraffin.
8. The embryoes are incubated again.Those embryoes dying with in 24hours of incubation is taken as nonspecific death and are discarded.
9. The remaining embryoes that die until 96 hours are collected. They are to be kept in +4c° for about 6-10 hours or over night(O/N).
10. The air sac of embryoes meant to be harvested is cleaned with povidon solution or tinture of iodine.
11. It is then separated by the help of a sterile scissors.
12. The allantoic fluid is exposed systematicallyand the fluid (the vaccine) is collected in a sterile container.
13. From every container sample is collected for Heamagglutination test(HA titration).

TESTING OF THE VACCINE:

The sterility test is conducted in :

1. Nutrient Agar.
2. Nutrient Broth.
3. Blood Agar.
4. Robertson,s cooked meat media.
5. Subouraud,s dextrose agar (room temperature).

The are kept at 37c° and in room teperature for five days. No growth of any sort should be observed.
STABILITY AND EID50 of the vaccine is also tested, but not in regular basis but once or twice in a year. HA test is done regularly for every batch that is produced. This test is done on
1 % washed chicken RBC.

SAFETY TEST:
This test is done on poultry.?????????

DISPENSING:

The ampules in which the vaccine is to be dispensed are printed with necessary information on
vaccine, its use, dose, immunity, expirey, keeping temperature etc is printed on the back of the ampule. It is sterilised and under sterile procedures dispensing of vaccine is done. That is 0.5 ml to each ampule. This is followed by freez drying for 24 hours. Before nicking of the ampules the ampules are vaccume tested. If the vaccume is complete then nicking of the ampules are done. With all these precautions if again there are some ampules that has incomplete vaccume, that particular ampule is discarded.

Before sending the vaccine once again a sterility test is conducted on the vaccine to make sure
it is double checked.
The dose for NDV is

Newcastle B1 for day old chicks, from a dilution of one ampule of the vaccine in 10 ml normalsaline two drops in eyes or nostril.
Newcastle LA SOTA for two weeks old chicks, same as above.
Newcastle K, for three months old and after, 0.5 ml, I/M in chest muscle. This vaccine is repeated every 3-6 months.

ECONOMIC STUDY: FOR **100 ML** HARVEST. (40000 doses)

No	Item	amount	Cost/Afs	USD
1.	Strain	one	10000	0.25
2.	Fresh, fertile hen eggs.	30 pcs	150000	3.6
3.	Phosphorus pentoxide	100gm	12000	0.26
4.	Penicillin	one vial	5000	0.1
5.	Streptomycine	one vial	5000	0.1
6.	Nystatine	one vial	10000	0.25
7.	Lactose powder	20gms	10000	0.25
8.	Peptone	10gms	5000	0.1.
9.	Na2Hpo4	1gm	5000	0.1
10.	KH2po4	2gms	10000	0.2
11.	Alcohol 75 %	100ml	10000	0.2
12.	Dittol	50 ml	3000	0.06
13.	Povidone	50 ml	3000	0.06
14.	Maintenance	_	10000	0.2

15.	Salary	_	100000	2.4
16.	Water and electricity	_	10000	0.2
17.	Transport	_	10000	0.2.
18.	Stationary	_	10000	0.2

Total in AFS. for each 100 ml harvest which gives about 40000 doses of Newcastle vaccine, is 378000 AFS divided by 40000 doses equals 9.64 AFS for each doses.

Australian NDV is costing 2.6 USD for each 100 doses. Each dose of this vaccine costs 1092 Afghanis. That is about 100 times of vaccine produced by ICRC supported vet vaccine production

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245		
4	Heamorrhagic septiceamia vaccine	669		
5	Sheep pox vaccine	4		
6	Fowl pox vaccine	14		
7	Newcastle vaccine	10		1,144
8	Sal.pullorum antigen	4		

Each USD equals 42000 Afs.

BEST REGARDS
VET AND HUSB TEAM

PROTOCOL FOR FOWL POX VACCINE

PRODUCTION METHOD:

In chick embryo by CAM method.

Seed strain from Razi of Iran, and IVRI of India.
Procurement of eggs are done on the principals followed on NDV.

1. Egg shell cleaned, incubated at 37c° and RH of 60 %. The eggs are shaken 3-5 times a day and temperature and RH is recorded daily.
2. On 5-6th day eggs are examined infertile eggs are discarded.
3. At the day of 11-12th all embryos are examined only the living embryos are used for production of vaccine.
4. The air sac area of the embryos are cleaned with antiseptics and marked a triangle in an area devoid of blood vessels and near embryo by a marker. The seed culture which is already prepared inoculated in specified area.
5. An ampoule which has no air in an aseptic condition is diluted **1:100** in normal saline to which 2000 I.U of penicillin and one mg of streptomycin is added to every ml.
6. Preparation of egg for inoculation:
   The air sac area of the embryo is cleaned with 75 % Ethyl Alcohol and a triangle is drawn in an area near embryo, but devoid of blood vessels. The shell of triangle is separated by egg driller in such a way that the under lying membrane remains intact. At the same time a narrow hole is created on the top of air sac.
   A drop of sterile normal saline is put on CAM by a sterile needle.The air of the air sac is drawn by a rubber bulb and an artificial air sac is created under the triangle.

INOCULATION OF THE SEED:

From the previously prepared dilution an amount of 0.1 ml is put on created artificial sac and the triangle is closed. The hole on the top of air sac is closed with solid paraffin. The embryos are incubated again as previously for three days. On 4th day it is taken out and kept in +4c° O/N.

HARVEST:

The shell of the egg is cleaned all over with 75 % ethyl alcohol. The shell is opened and CAM is harvested. It is to be mentioned that every step in the production is performed aseptically.
A sterility test is conducted on harvest. After a satisfactory sterility test, the harvest the CAM is triturated by blender and to a ratio of **4:100** PBS (phsphate buffer saline) solution PH 7.2-7.4 is added. That is 4ml of PBS to 100 ml of vaccine. Then dispensing in vial is done and sent for freeze drying.

STERILITY TEST:

Sterility test is conducted as in Newcastle disease vaccine.

SAFETY TEST:

A double dilution of the ratio of **1:10, 1:20, 1:40** is prepared. From each dilution inoculation
is made to a susceptible chick of 1-3 months by scarification method. No untoward reaction is to be seen. The chick that is inoculared with **1:40** must show pock formation on the site of inoculation for a potent and good quality vaccine. The chicks are observed for 14 days, and on 21st day serum is collected for plate agglutination test with antigen.

ECONOMIC STUDY ON FOWL POX VACCINE: (for 100 ml stock)

No.	Item	Amount	Cost/Afs
1.	Fertile hen egg	30	200000.
2.	Phosphorus pentoxide	100gms	20000
3.	Penicillin	1.0vial	12000.
4.	Steriptomycin	1.0 vial	5000.
5.	Nystatin	1.0 vial	10000.
6.	Lactose	20 gms	20000.
7.	Peptone	10 gms	10000.
8.	Na2HPO4	1.0gm	5000.
9.	KH2PO4	2.0gms	5000.
10.	Equipment	-	20000.
11.	Alcohol 96 %	100ml	20000.
12.	Dittol	50 ml	5000.
13.	Povidone	50 ml	5000.
14.	Electricity	-	5000.
15.	Water	-	5000.
16.	Salary	one day	150000.
17.	Transportation	-	10000.
18.	Stationary	-	10000.
19.	Maintenance	-	10000.
TOTAL			**527000 AFS**

Each 100 ml stock gives about 40000 doses of Fowl pox vaccine.
Each dose cost 14AFS.
An ampoule of 100 doses costs AFS=1400.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245		
4	Heamorrhagic septiceamia vaccine	669		
5	Sheep pox vaccine	4		
6	Fowl pox vaccine	14	---	---
7	Newcastle vaccine	10	---	1,144
8	Sal.pullorum antigen	4		

Each USD equals to 42000 Afs.

Best Regards
Vet and Husb Team.

PROTOCOL FOR SHEEP POX VACCINE AND ECONOMIC STUDY

Seed virus:

Romanian strain.

Sheep used:

Susceptible lamb of 6 months to one year. Before the use of sheep for inoculation of the seed the animal is kept under observation for 3-4 days. During this period the body temperature of the animal is recorded morning and evening.

Preparation of sheep for inoculation:

Both side of the sheep from the area behind the Scapula to the last Rib is shaved, washed with soap and disinfected with a suitable disinfectant.

Seed preparation:

Four ampoules of the seed virus are dissolved in 120 ml of sterile normal saline for inoculation. Each side of the sheep is cleaned with a suitable or available antiseptic. Six points in a horizontal with equidistant spaces in between, in two rows is selected and to each one **10 ml** of seed is inoculated. The temperature of the inoculated sheep are recorded morning and evening until it shows the highest temperature. The area of injection is inflamed and show local reaction. The recording of temperature is continued until a decline is observed in temperature. This will take 5-6 days. Thereafter the sheep is slaughtered.

Separation or harvest of virus from tissues:

The tissues and the fluid of the area is separated and collected aseptically in a beaker.

Trituration of the tissues:

The tissues are weighed and to the rate of 1/3 sterile serum, sterilised by filtration, is added. Then it is triturated by blender. It is then filtered. To each millilitre of the filtrate 2000 I.U of Penicillin and 2mgs of Streptomycin is added and kept in refrigerator.

Internal Quality Testing:

Sterility testing:

A sample of the harvest is inoculated to common laboratory media like; Blood agar, Nutrient agar, Nutrient broth, Robertson's cooked meat media and subouraud` s dextrose agar at 37c° and room temperature for five days.

Safety test:

From a dilution of 1/10, 1/20, aseptically is inoculated intra dermal in to four points of the under side of a susceptible sheep aseptically. The temperature of the sheep is recorded twice daily for 15 days. Both sites of inoculation must show reaction, that is by pock formation. But no untoward effect is to be observed. After having the assuring result, it is to be proceeded for freeze drying.

The dose for this vaccine is 0.1 ml.
Diluent- Normal saline.
Route of inoculation- I/D.
Site of inoculation -Under side of the tail.
Keeping temperature -20c°.
Immunity- one year.

ECONOMIC STUDY:

No.	Item	Amount	Cost/Afs
1.	Sheep	one.	800000.
2.	Feed	-	100000.
3.	Sterility	Media	10000.
4.	Transport	-	10000.
5.	Alcohol	100 ml	10000.
6.	Equipment	-	10000.
7.	Antibiotics	one vial each	15000.
8.	Sheep for testing	-	50000.
9.	Water	-	5000.
10.	Electricity	-	5000.
11.	Salary	one day	150000.
12.	Maintenance	-	10000.
13.	Stationary	-	10000.
TOTAL			**1185000.**

The result here will be 300 ml of harvest, which will give about 300000 doses.
Cost of one dose about four Afghanis.
One ampoule of 200 doses costs 800 Afs.

The nearest counterpart to our vaccine is Pakistani vaccine which costs Rs.50/ 100 doses. By this account each dose will cost 425 Afs.
The next vaccine to compare is Lelystat which costs 5.20 USD/100 doses. Each dose will cost about 2184 Afs.

No	Name of the vaccine	Cost/dose of kv(Afs)	Cost/dose of pv(Afs)	Cost /dose of ov (Afs)
1	Anthrax spore vaccine	12	450	714
2	Black quarter vaccine	405		
3	Enterotoxeamia vaccine	245		
4	Heamorrhagic septiceamia vaccine	669		
5	Sheep pox vaccine	4	450	2,180
6	Fowl pox vaccine	14	---------	----------
7	Newcastle vaccine	10	---------	1,144
8	Sal.pullorum antigen	4		

Indicators:
kv-Kabul vaccine.
pv-Pakistani vaccine.
ov-Other vaccine

BEST REGARDS
VET AND HUSB TEAM

APPENDIX 9

BRIEF REPORT ON THE BACTERIAL VACCINES PRODUCTION IN THE MADERA LABORATORY JALALABAD – (Afghanistan)

Brief Report

on bacterial vaccine production
by vaccine production laboratory in Jalalabad

Livestock is a major economical component of Afghan farmers and a valuable wealth source for Afghanistan, which has been seriously affected during the war due to many different causes. One of the causes can be total destruction of vaccine production laboratories in Kabul, bringing the loss of animals to a maximum. Importation of vaccine from abroad and its early on and on time disposal of vaccines to the farmer due to the lack of transportation, proper storage and other factors also were not proofing much effective due to loss of efficacy of the imported vaccines.

Therefore, MADERA, an organization that which is working for the development of rural economy in Afghanistan, took the initiative to rehabilitate vaccine production laboratories in 1997 to provide necessary vaccines for the eastern and, to a certain extent, central zones of Afghanistan and other working areas.

From January to the end of August 1997, all necessary conditions such as providing and washing rooms, stores, constructions of additional 3 rooms, purchase of necessary equipments, provision of seed culture, purchase of necessary chemicals, experimental animal and etc were achieved.

The laboratory was officially inaugurated on November 7, 1997 in the presence of Headquarters of MADERA, Governor and other high officials of the Eastern Zone, FAO officials and all other NGOs' representatives.

During 1997, the laboratory produced 91200 doses of ETV, which was successfully used in the target areas to campaign against the diseases during lambing season.

Production of bacterial vaccines for the eastern and central zones, some FAO clinics, some NGOs and Jalalabad government clinics, is shown in the following tables (November 19997-December 19998):

Month	Type of vaccine ETV
December 1997	91200

Vaccines produced in 1998 (in doses)

Type of vaccine / Month	ETV	BQV	HSV	ASV	CCPP
January					160000
February	Under process	U. process			
March	95000	40000	U. process		
April	870000	43500	74500		
May				68000	
June				300000	
July		U. process	U. process		
August		20000	20000		
September	U. process		117600		

October	120000				
November	U. process				
December	140000			U. process	
Total production	442000	103500	212100	368000	160000
Grand total (doses)		91200 +	**1285600** = 1376800		

Total production of bacterial vaccines in 1997 and 1998 is:

91200 + 1285000 = 1376800 doses

Besides this, we have produced concentrate for 1200000 doses of ASV to be diluted and bottled for future use.

While the original plan for 1998 was one million doses, our production shows more than twice of the objective.

Jalalabad, January 5, 1999

Dr. Mohauddin *ARZO*

APPENDIX 10

CORRESPONDENCE FROM F.A.O. TO I.C.R.C. AND MADERA

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

دملګرو ملتونو
د خوراك اوكرهني اداره

PROJECT AFG/96/007
Livestock Development for Food Security
in Afghanistan

Address House 8, Str. 30, F-7/, G.P.O.Box 2713, Islamabad, Pakistan Ph. (51) 821517, 821603 Fax 828173 EM afg96007@faopak.msm.cgnet.com

8 November 1998
Ref: 10\kbl'vlab1.wp5

To: Mr. Rod Charters, ICRC, Kabul, Afghanistan
M. Jean-Francois Cautain, MADERA, Peshawar, Pakistan.

Vaccine production in Afghanistan

Further to our recent joint meeting on the above subject I list below our normal annual requirements for vaccines that we supply to our VFUs. This will give you an indication of the types of vaccines that need to be manufactured.

Type of Vaccine	Estimated number of doses
~~Anthrax~~	~~5,000,000~~
Enterotoxaemia	4,000,000
~~Sheep pox~~	~~1,000,000~~
Blackquarter	1,000,000
Pasteurellosis (Lysopast)*	1,000,000
Hemorhagic Septemcemia	400,000
~~Pestes des petit ruminants~~	~~2,000,000~~
~~Newcastle disease in poultry~~	~~5,000,000~~
~~Gumboro disease in poultry~~	~~500,000~~
~~Fowl pox in poultry~~	~~100,000~~
Total	**20,000,000**

*"Lysopast" is a trade name for a vaccine manufactured in France that can be used for both cattle and sheep (HS and pasteurellosis respectively).

In addition I would like to confirm that we would strongly support the formation of the committee to run the vaccine laboratory in Kabul. As discussed the committee should consist of ICRC, MADERA, FAO, VSA Kabul and a member from the vaccine laboratory. It was also agreed that this committee should meet in Kabul on 2nd December 1998.

With best regards,

Terence J. Barker
Programme Manager
AFG/96/007

C.C.: Dr. A.B. Mehrahban, FAO, Islamabad.

, AND AGRICULTURE ORGANIZATION
HE UNITED NATIONS

دملګرو ملتونو
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ddress House 8, Str. 30, F-7/, G.P.O.Box 2713, Islamabad, Pakistan Ph. (51) 821517, 821603 Fax 828173 EM afg96007@faopak.msm.cgnet.com

8 November 1998
Ref: 10\icrc'athrxv1.wp5

To: Mr. Rod Charters,
ICRC,
Kabul, Afghanistan

Dear Rod,

Anthrax Vaccine

This letter is to confirm that FAO Livestock Development for Food Security Programme will support the purchase by the Veterinary Services Association of the Anthrax vaccine manufactured in the Kabul vaccine Laboratory. Since the test results on samples of this anthrax vaccine were satisfactory and because there is no possibility of testing it elsewhere at this time, we accept the tests carried out in Peshawar, Pakistan. The Animal Health Department, FAO headquarters in Rome, have supported this view and are also willing to accept local test results under the circumstances.

We understood that you have about 0.5 million doses available and we agreed on a price of 25 paisa (0.25 Pak Rupees) per dose.

With best regards,

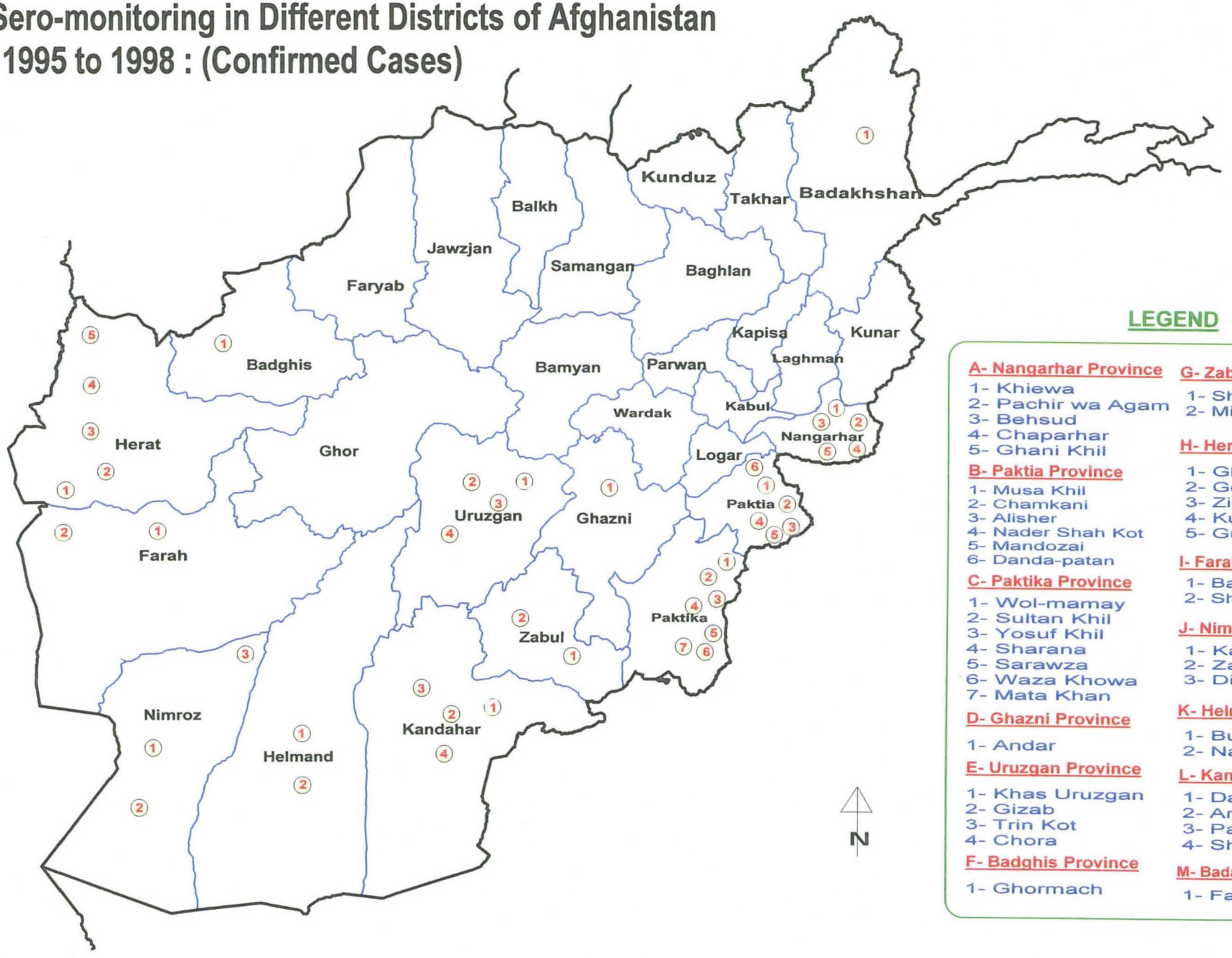
Terence J. Barker
Programme Manager
AFG/96/007

C.C.: Dr. A. Majok, Epidemiologist, FAO, Islamabad.
Dr. A.B. Mehrahban, FAO, Islamabad.
Dr. A. Osmani, FAO, Islamabad.

APPENDIX 11

P.P.R. SERO-MONITORING SURVEY IN AFGHANISTAN BY F.A.O. (1995-1998)

PPR Sero-monitoring in Different Districts of Afghanistan From 1995 to 1998 : (Confirmed Cases)



LEGEND

A- Nangarhar Province
1- Khiewa
2- Pachir wa Agam
3- Behsud
4- Chaparhar
5- Ghani Khil

B- Paktia Province
1- Musa Khil
2- Chamkani
3- Alisher
4- Nader Shah Kot
5- Mandozai
6- Danda-patan

C- Paktika Province
1- Wol-mamay
2- Sultan Khil
3- Yosuf Khil
4- Sharana
5- Sarawza
6- Waza Khowa
7- Mata Khan

D- Ghazni Province
1- Andar

E- Uruzgan Province
1- Khas Uruzgan
2- Gizab
3- Trin Kot
4- Chora

F- Badghis Province
1- Ghormach

G- Zabul Province
1- Shar-e Safa
2- Mizan

H- Herat Province
1- Ghorian
2- Gozara
3- Zindajan
4- Kushk
5- Gulran

I- Farah Province
1- Bala Buluk
2- Shindand

J- Nimroz Province
1- Kang
2- Zaranj
3- Dilaram

K- Helmand Province
1- Bust
2- Nawa

L- Kandahar Province
1- Dand
2- Arghandab
3- Panjwai
4- Shega

M- Badakhshan Prov.
1- Faizabad

APPENDIX 12

CORRESPONDENCE FROM M.O.A. TO I.C.R.C. ON ANTHRAX VACCINE PRODUCTION

MINISTRY OF AGRICULTURE
DEPUTY ANIMAL HUSBANDRY
VET DEPT.

To

ICRC Kabul

ATTEN.vet and husb team.

Sir,

Acoording to the understanding between ICRC and ministry of agriculture(MOA)on joint vaccine productin venture, the vaccine produced is to be bought by FAO for use only inside Afghanistan. After conducting the required quality test by FAO they are ready to purchase the vaccine. In this connection the FAO representative had already expressed their willingness to MOA and to ICRC Relief Co-ordinator. Similarly based on an understanding between vet dept and Mr.Rod Relief Co-ordinator the vaccine is to be released as early as possible. I hereby would like to state that any untoward reaction of this vaccine will not be the resposibility of ICRC. Because this vaccine has been produced according to national standards and specifications as it used to be in the past. MOA permits the use of this vaccine in side the country. I would also like to remind you of the content of our letter No.371, which has already been sent to you and request you to expand your activities and produce all the vet vaccines that were produced in this vaccine production before the internal conflicts. Because production of the mentioned vaccines are absolutely necessary to reach humanitarian helps to the people.
BEST REGARDS

Qari mohd.Jameel saheeqi
cheif of vet dept(MOA)

APPENDIX 13

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